MAPPING THE DYNAMICS OF RESEARCH OUTPUT PRODUCTIVITY: VIEWED FROM A STATISTICAL RESEARCH SUPPORT PERSPECTIVE

by

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Declaration

I declare that

"*Mapping the dynamics of research output productivity: Viewed from a statistical research support perspective***"**

is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references. I further declare that I have not previously submitted this work, or part of it, for examination at UNISA for another qualification or at any other higher education institution. (The dissertation or thesis will not be examined unless this statement has been submitted.)

30-10-2015

H Muller **Date**

Acknowledgements and dedication

I stand in awe – analogous to theory evolvement in this study – at how the means of support, love, advice, encouragement, and loyalty from friends, colleagues, learned people and family evolved during this epic journey to plot a life time of experience that can hopefully benefit present and future researchers and research discovery as to how the production of research and the publication thereof can be achieved more effectively.

Without such an amazing and dynamic support group this theoretical discourse would never have materialized. This journey was indeed a team approach to research. What best conveys gratitude at this stage? Mentioning each and every one by name in this acknowledgement will not suffice. In my view the best approach will be give credit to the God for allowing these exceptional people to pass my way.

- The people that enabled me to start the journey,
- The people who encouraged me along the way,
- My supervisor who had to co-struggle through theory and personal development pains,
- Language knowledge and skills of a wonderful language editor,
- The technical skills and knowledge of a Turn-It-In specialist (plagiarism),
- The CGS and management that allowed me the opportunity to study,
- Experiences of academic researchers whose input were included as data in this research,
- My amazing circle of friends, who never gave up on me,
- My husband, sons, daughter and grandson.

A truly epic journey of discovery which left me a humbled person.

Abstract

Interest in effectively publishing academic articles stems from involvement in statistical research support provided to academic researchers conducting their research. In the context of this study research output (RO) is defined as the publication of research findings (articles) in academic journals accredited with the South African Department of Higher Education and Training's (DHET). The vantage point of this research is that of research support statisticians.

New knowledge is continually required to drive decision making, policy formulation, industry, economies, regulation, development, innovation and progress (SESCES 2015:9; Pullinger 2014). Quality published research serves as a reliable source of new information. Therefore measures are globally and nationally implemented to stimulate article publication. Such measures and incentives include measurement of publication rate; journal impact ratings; government funding of research based on research output; acknowledgement as research-intensive institutions, promotion opportunities linked to publication rate and more.

Although the literature reports on aspects of the production and publication of research findings, limited research is reported on research output productivity (ROP) viewed from the perspective of the statistical community that support research within the research process. Therefore a theoretical framework for ROP had to be developed. Classic grounded theory (GT) proved to be an appropriate methodology for this research based on its theory-develop properties.

The literature, responses to an open- and closed-ended questionnaire, observational field notes of this researcher and informal discussion notes were inter alia used as data bases in the cycles of data-collection-analysis-and-comparison that characterise GT implementation.

Theoretical components ('categories') that emerged in the research include the *research process* as central concept (the 'core category'), a *research practice* component; *role players* in the research process; the *attitude* of researchers; *knowledge* of researchers; *skills and attributes* of researchers; *research resources* and *research resource centres*; and the *research climate* of the researcher *environment*. These components constitute the factors that impact ROP. Relational links - which forms the second leg of a developing theory - between these components are explained quantitatively in terms of multivariate linear regression equations; a profile of researcher-type (discriminant analysis) and qualitatively by means of the literature and field notes of this researcher. The emerged theoretical model indicates that knowledge and skills of academic researchers, as well as researcher-type directly impact on the research process and therefore on ROP. Furthermore attitude forms a discriminatory attribute of academic researchers.

The objective with the development of the model of ROP was to identify important components of RO delivery and propose grassroots recommendations to promote ROP.

Keywords

Research output productivity; theoretical model; research support statistician; statistical research support perspective; grounded theory; factors that affect research output productivity.

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Chapter 1
Motivation, contextualisation and problem statement

1.1 Introduction

This thesis recounts an investigation into factors that affect the production and publication of research findings and the dynamics that underlie research output productivity. The study is approached from the perspective of the statistical community that supports research: a statistical research-support perspective. The research is based on a grounded theory (GT) research methodology.

Although literature reports on studies that investigate individual factors or events (e.g. English proficiency) or clusters of factors or events that impact on the production and publication of research findings (e.g. researcher skills which include subject specific knowledge, research skills, English proficiency, writing skills) to date, no account could be traced that models the layered dynamics of these impacting effects on research output delivery as viewed from the perspective of the statistical community that supports research endeavours. Support in this sense refers to statistical services rendered to academic researchers who undertake research. This study, therefore, aims to incorporate the experiences of statistical support into the greater and dynamic picture of producing and publishing research findings.

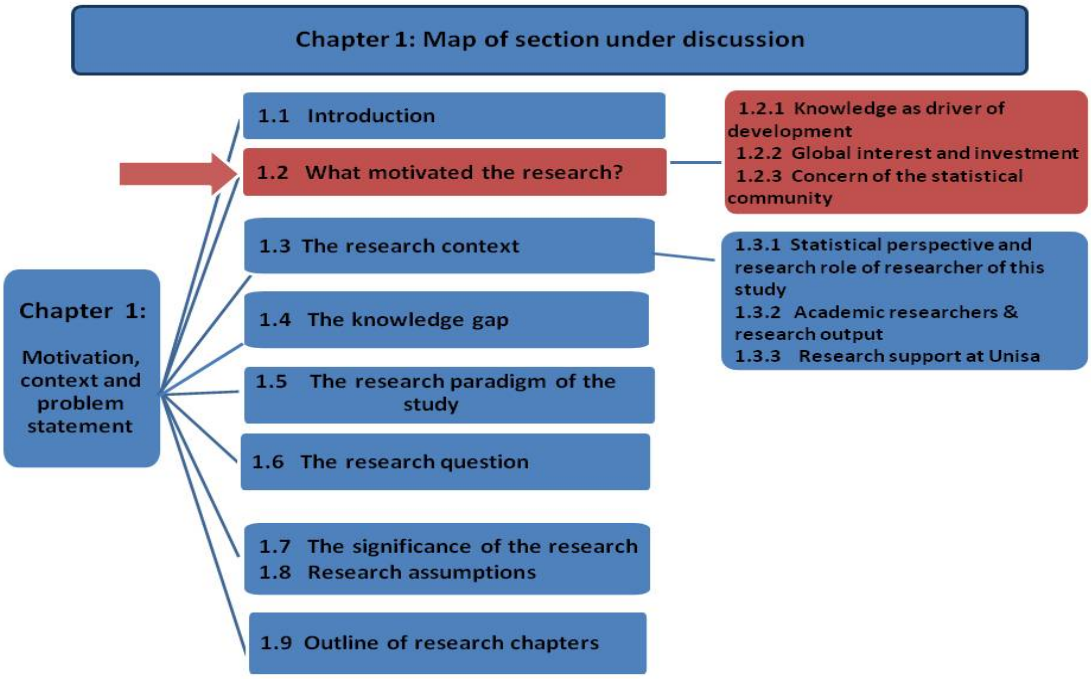
In the chapters that follow the discussion will indicate that little research has been done on events that affect research output production. Further, and owing to (i) the lack of a well-established model for the dynamics of research productivity and (ii) the property of grounded theory method (GTM) to develop theory in a little researched field, grounded theory proved to be an effective and appropriate methodology to model this phenomenon. Although mostly used for qualitative studies, grounded theory is also applicable to mixed methods studies as is the case in this investigation where qualitative and quantitative data sources are used.

This study offers the potential of developing a comprehensive model of the dynamics of research output productivity by incorporating the elements of (i) experience and observations of the statistical research support community and academic researchers; and (ii) the theory generating properties of grounded theory method (GTM). In this way and from a statistical perspective this research can contribute to a better understanding of how 'doing research' and the findings of 'doing research' (publication) become accessible to interest groups in good time.

This chapter will introduce the research by elaborating on the background and motivation for the study; the context of the research; the knowledge gap that this research addresses; a brief overview of the research paradigm, theoretical framework and choice of research methodology; the research question/s asked of the research and the aim of the investigation; the foreseeable significance of the study and assumptions made in the investigation. The chapter concludes with an overview of the chapters to follow. In this way an outline of research progression on impacting events (or factors) on the delivery of research output is provided.

A system of diagrams labelled, "*Map of the section under discussion*", has been included throughout the text to serve as a reminder of the flow of the argument in each chapter. The first of these maps follows in section 1.2.

1.2 Background: what motivated this research?



The argument for the motivation of this study focuses on

- The importance of new knowledge as a driver of decision-making and development
- Research as knowledge source (research publication) and higher education institutions (HEIs) as reliable knowledge producers
- Global interest and investment in research which bear testimony to the importance attributed to new knowledge by society
- The need for quality knowledge as a concern of the statistical community
- The need for reliable and timely new knowledge that results in incentive measures being instituted to drive up research output production.

1.2.1 Knowledge as driver of development

Technological advancement in the 20th and 21st century brought about the ability to generate, store and retrieve limitless volumes of information. The concepts of *information-at-your-fingertips* generation; the data revolution era; and the Big Data approach became challenging realities in especially the 21st century (Pullinger 2014:2; Dr D Pfefferman, Morris Hansen lecture, National Agricultural Statistics Service (NASS), New York 2015:8). The value of information and the 'overabundance' thereof in real time (Giovannini 2005:3) is indisputable and, sometimes, overwhelming: how to react appropriately and interpret and use knowledge derived from information remains a challenge. The question of reliable, trustworthy and relevant information and knowledge is ever present (Pfefferman 2015:8; Johnston 2005:34).

The Science Europe Scientific Committee for Engineering Sciences (SESCES) in their 2015 Opinion Paper (SESCES 2015: 11,13) stresses the critical consequence of the information explosion to society,

namely the *information-to-knowledge* link. The committee states that without scientific insight into freely available and accessible information, information does not migrate to knowledge. If this important point is understood in conjunction with the reality that new knowledge, assimilated into the global information structure, drives the world in decision making, policy formulation, industry, economies, regulation, development, innovation and progress *(SESCES 2015:9; Johnston 2005:35;* Moriguti, Diggle, Gower, Wallman and Wang 1992; Giovannini 2005:4; Pullinger 2014), the importance and impact of new knowledge to society becomes obvious. Figure 1.0 illustrates this point. The American Statistical Association (ASA) elaborates on this point by indicating that society reacts to knowledge stimuli – be these trustworthy or not (Wong: 2009). Reactions may vary from the choice of the next movie to watch following the impact of a movie-trailer advertisement to the sounding of a tsunami warning based on reliable predictions of earth movement (Fountain 2015).

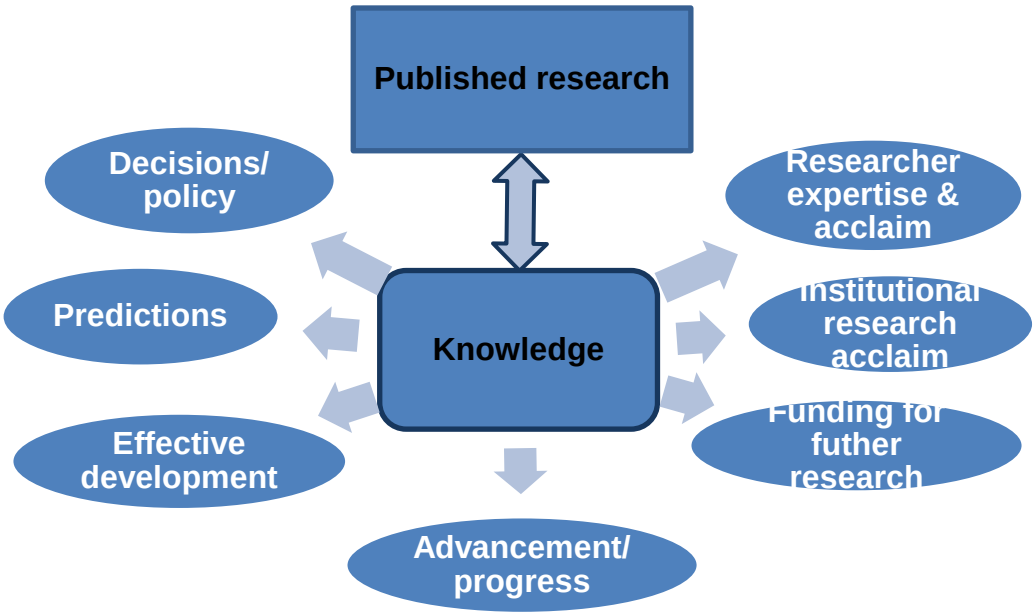
Research, furthermore, generates and provides a very specific type of knowledge, which possesses desirable attributes namely, availability, accessibility, reliability and trustworthiness (Johnston 2005: 33, 36). When valuable, best-practice research knowledge is immediately accessible (SESCES 2015: 8, 9, 12, 13) the impact of clever decision-making becomes obvious. For instance, Iceland is prone to frequent volcanic eruptions, therefore the type of knowledge required to protect and forewarn Icelandic communities, and to ensure a sustainable livelihood, needs to be reliable, relevant and timely (Fountain 2015). This example stresses the societal value of reliable research knowledge (SECES 2015: 8, 13, 23). In the current energy crisis of the 21st century, cost-effective planning, application and consumption of energy are essential for continued development and progress. This applies to electricity, oil, coal, gas, renewable energy and hybrid renewable energy systems (Haneef and Memon 2014; Dippnall 2015; Cameron 2015). These examples refer to aspects of community life that can cause an entire economy to prosper or flounder.

Quality fore-knowledge and information strengthen strategic planning and development (FFC 2013:271). The crux of the argument is the timely availability of quality, relevant and reliable knowledge. Not all new knowledge however (in an internet-dominated, easy-access to information world) is of the quality and reliability required to accurately predict, for example, the impact of fracking for gas on eco-sensitive areas (Dippnall 2015). The execution of proper, quality research is a critical generator of the correct type of knowledge required to promote decision making, government planning and policy; industrial and agricultural advancement and efficiency; progress; sustainability; and an understanding of human behaviour.

Research serves as a quality source of new knowledge, and publication of research findings (in accredited journals) presents a powerful mechanism to avail trustworthy knowledge to interest groups (Tongai 2013; SESCES 2015:9, 12; Derntl 2014). The kingpin of this *flow-of-new-information* argument is the provision of new knowledge to society via the publication of research. Prior to the publication of research findings and knowledge, interest groups have no access tothe new knowledge however innovative or high-impact the findings might be.

This line of reasoning provides the first motivational angle to the interest of this research in the dynamics of research output productivity: delivering knowledge that society needs. In this sense research output productivity comprises 'doing research' and publishing the research findings.

Figure 1.0: The importance and impact of new knowledge



1.2.2 Global interest and investment in research bear testimony to the critical role of new knowledge (research publications) in society

The previous subsection argued that new knowledge drives decision making, policy formulation, development and sustainability (Johnston 2005:34-35). The section indicated that research, and as such published research, presents as a reliable source of knowledge. In this regard Kelly (2008) indicates that higher educational institutions (HEI) and the academics affiliated with these institutions serve as the obvious places where research is undertaken and knowledge generated (SESCES 2015:21; Odhiambo and Ntenga 2013:271). In this argument the contribution of industry, other research interest groups and private research initiatives are not ignored and the value of collaborative research efforts with HEIs is appreciated. However, HEIs are globally regarded as the primary locations of research, and incentives to stimulate research - and subsequent new knowledge production - often focus on HEIs. Literature abounds with initiatives that aim to ensure the production, quality and accessibility to new knowledge in the form of published research articles. An article by Tongai (2013), for example, discusses financial incentives offered by the South African Department of Higher Education and Training (DHET). The subsections that follow describe types of incentives.

1.2.2.1 Measures towards quality and base-lining research

(i) Tightly interwoven with new knowledge production and article publication are incentives, measurement and per-country comparison of quantity and quality of research output that feed into the global knowledge base (BIS 2013; Pouris 2012; DHET 2014; FFC 2013; Odhiambo and Ntenga 2013:270-288; SCImago 2014; URAP 2015). Baseline comparative standards have evolved that include the measurement of the number of articles published and research output units earned for HEIs; the number of article citations; citation indices; contributions of specific research fields; cross country research collaboration; article impact and linked indices. Likewise the quality and esteem of journals are measured, evaluated and compared in world ranking figures and impact indices (Altbach 2014). Several acknowledged agencies and institutions monitor and rank research-output quality and quantity (of HEIs). These include for example, URAP (University Ranking by Academic

Performance. 2015) ; ARWU-Jiao Tong (Academic Ranking of World Universities, China 2014); TIMES (Times Higher Education World Ranking, UK 2015); Leiden, Netherlands (2015); QS World University Rankings, UK (2015); Webometrics, Spain (2015); HEEACT or NTU, Taiwan (2015); SCImago Journal Ranking (SJR), Spain). These agencies do global journal quality rankings and impact studies (Journal impact Factor, JIF, GISI, 2015) using acknowledged and credible research output data sources such as Thomas Reuter's Web of Sciences/ Social Sciences (2015); Elsevier's Scopus (2015); and Google's Scholar Metrics (2015). All of these measures contribute towards quality research entering the global knowledge network.

1.2.2.2 Research excellence

Global comparison of research output measurement not only aims to monitor and improve quality, it also serves to identify specific HEIs as centres of research excellence/ or research intensive institutions (Cloete, Maassen and Bailey 2015). The benefits that recognition as a research institution brings to HEIs are obvious. The same applies to journals rated as top academic journals in the sense that these journals earn acknowledgement as scholarly innovative leaders in their specific subject fields. Apart from esteem (Woodiwiss 2012: 421), top ratings place HEI institutions in a favourable bargaining position to attract research capacity in the form of established academic researchers and post-graduate students (Altbach 2014). This in turn stimulates and advances high quality research. To top-ranked academic journals it allows the freedom to select and attract innovative, quality research articles which, in turn, further elevates the quality and ranking of the journal. To academic researchers affiliation with top-rated HEIs and publication in scholarly journals imply recognition as esteemed researchers with easier access to funding, research opportunities, rewards, promotion and continued research involvement (Woodiwiss 2012: 421).

The argument of this section towards motivating the focus of this study on *research publication* can furthermore be strengthened by positioning South Africa on some of the research output criteria discussed, namely (i) in terms of international research output ratings; (ii) in terms of rating within the African continent; and (iii) in terms of HEIs within South Africa. Please refer to Figures 1.1 to 1.3 that illustrate some of the evaluation criteria. For example Figure 1.1 indicates that South Africa's contribution, currently, in relation to global research publication and new knowledge generation is limited. This serves to motivate South Africa to increase research publication if it is to be recognised as a contributor to global research. Of particular interest to this research is a deeper understanding of the dynamic interplay of events and factors *that impact research output productivity*, the topic of this thesis. Deeper insight into this phenomenon can increase the output productivity of the African region. On the other hand Figure 1.2 indicates that in relation to the African continent South Africa is the leading player in research output productivity (Cloete, Maassen & Bailey 2015; Jeenah and Pouris 2008:354) and should strive to maintain this position in Africa. With regard to Figure 1.3 the trend points to HEIs in South Africa that are acknowledged/have the potential to be acknowledged as research intensive universities (Altbach 2014). For example the University of Cape Town is recognized as a research intensive university along with the universities of the Witwatersrand and Stellenbosch. These universities report high research output figures (Cloete 2015; N Cloete et al 2015; Bunting, Cloete and Van Schalkwyk 2014). Tongai (2013) confirms that the DHET recognises the University of Stellenbosch as the top South African research producer for three consecutive years and as such as a research intensive university.

Figure 1.1: Contextualising SA's international research output position (2013/2014) using URAP (2015) ranking of select international and South African HEIs

University legend:

Hvd = Harvard; Oxf = Oxford; Stn = Stanford; Toy = Tokyo; Syd = Sydney; Kyo = Kyoto;
RdJ = Rio de Janeiro; CT = Cape Town, SA; WTS = Wits, SA; KZN = KwaZulu-Natal, SA; US = Stellenbosch, SA; UP = Pretoria, SA; UJ = Johannesburg, SA; NW = University of North-West, SA; UWC = University Western Cape, SA; Rh = Rhodes, FS = Free State, SA; PE = NMMU, Pert Elizabeth, SA; Uni = UNISA, SA.

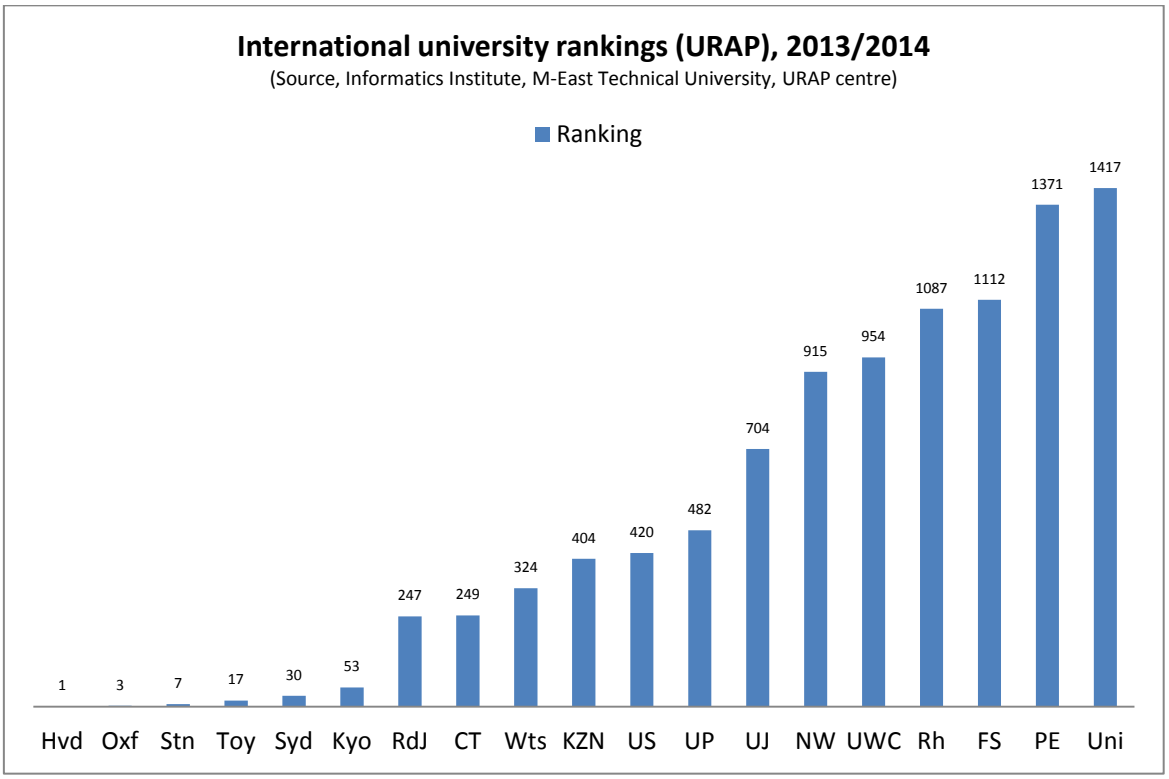


Figure 1.2: Positioning South African research output within the African context: a comparison of universities of eight African countries 1996-2013

(**Sequence of countries in Figure 1.2:** South Africa; Uganda, Ghana, Kenya, Botswana, Tanzania, Mauritius, Mozambique. **Source:** "Knowledge production and contradictory functions in African Higher Education", Cloete 2015; Cloete, Bunting, Sheppard and V Schalkwyk, in Cloete, Maassen & Bailey 2015)

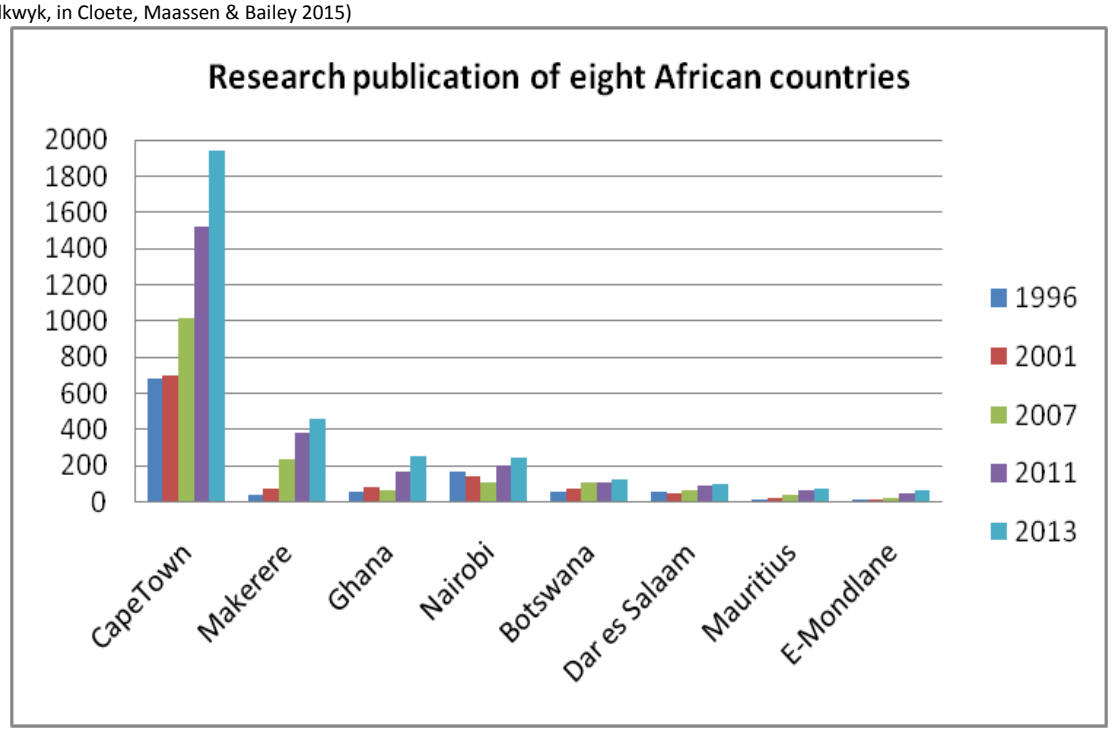
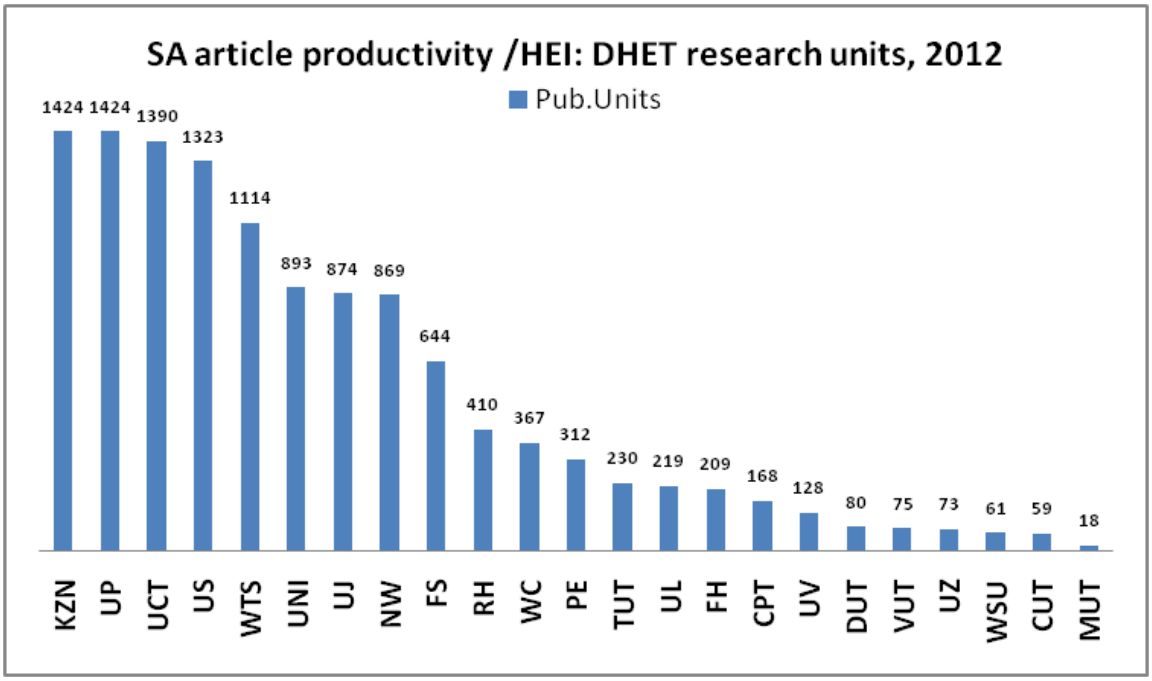


Figure 1.3: Contextualising Research output in South Africa: Article productivity (research units) of South African HEIs, 2012 output

University legend:
KZN: KwaZulu-Natal; UP: Pretoria; UCT: Cape Town; US: Stellenbosch; WITS: Witwatersrand; UNI: UNISA; UJ: Johannesburg; NW: North West; FS: Free State; RH: Rhodes; WC: Western Cape; PE: Nelson Mandela Metropolitan University; TUT: Tshwane University of Technology; UL: Lesotho; FH: Fort Hare; CPT: Cape Peninsula UP; UV: Venda; DUT: Durban UT; UZ: Zululand; WSU: Walter Sisulu; CUT: Central UT; MUT: Mangosuthu UT. Source: DHET (2014)



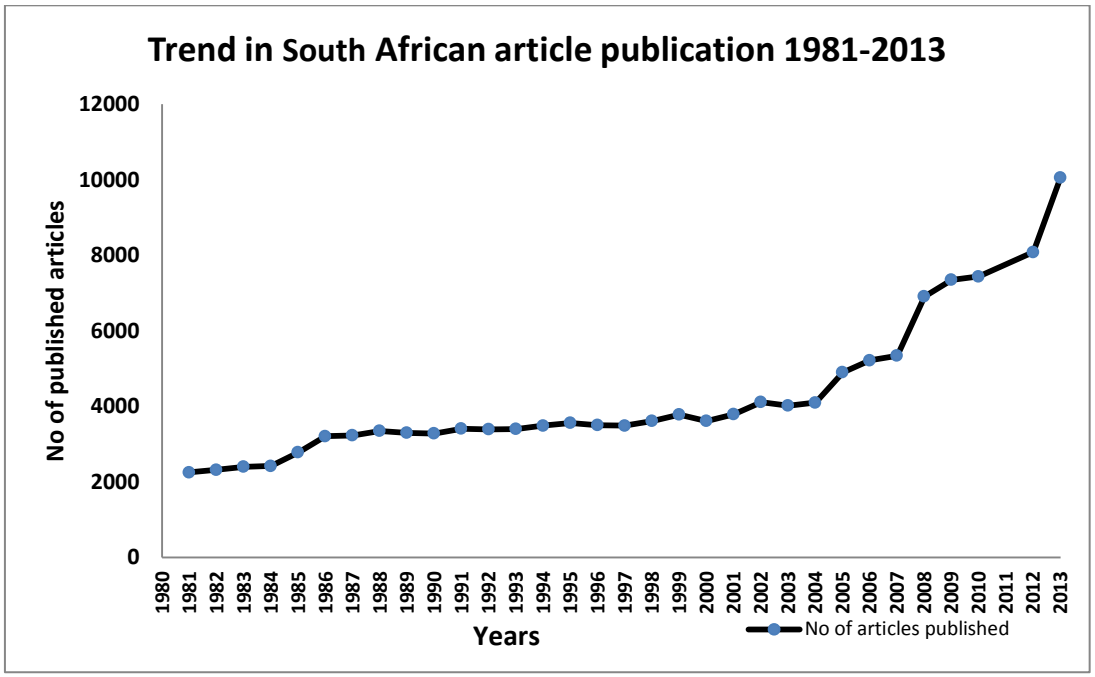
1.2.2.3 Incentives to stimulate research publication

Another compelling component of availing research knowledge to society - apart from ensuring quality knowledge and global base-line comparative output criteria - centres on reward incentives that stimulate research productivity. These types of incentives take on the form of excellence-research-rewards and monetary gain for institutions and researchers, and indirect rewards in the form of promotion, tenure, acknowledgement, improved research and work environment and prospects of appointment at research intensive or esteemed HEIs (Tongai 2013). [Besides the mentioned incentives an example of a special incentive in South Africa concerns the institution of government funded research chairs to promote specialised research (NRF 2015:3, 5)].

Incentives increase publication rate. Pouris (2012) illustrates this point by reporting on the increase in publication rate at South African universities following the introduction of the NFF (New Funding Formula) for research subsidy published in the Government Gazette, no. 1792, 2003, and implemented in 2004/5 (RSA,DHET 2003). Figure 1.4 clearly indicates the sharp incline in research publication following 2004. Other researchers (Tongai 2013) affirms Pouris' claim.

Figure 1.4: The sharp incline in South African publication output (1982-2010) following NFF implementation 2004.

Source: Pouris (2012); DHET (2015)



How are incentives financed and implemented? Governments invest heavily in research. This is evidenced in the proportion of per country GDP earmarked for research (e.g. South Africa's % of GDP devoted to research for 2001/2002, 2005/2006, 2008/2009 and 2012/2013 was respectively 0.73; 0.92, 0.87 and 0.87% (DST 2014:10;). Governments implement these incentives and subsidies in different ways: the U.K. for example, - following the implementation of an RAE (Research Assessment Exercise) project in 1989 - proportionally awards funding to academic institutions based on best research-performing criteria. Norway, Belgium, Denmark and Italy distribute their research

budgets on similar terms. Countries like Germany, Spain, the US and Canada offer indirect incentives linked to career promotion, while others, e.g. Russia, Turkey, China and Korea offer substantial cash bonuses to researchers per article published (Franzoni, Scellato and Stephan 2011:702-703; Woodiwiss 2012: 425; Altbach 2014). These examples illustrate three types of incentive categories, namely, policies that fund institutions; policies that reward individual researchers indirectly (promotion and salary differentiation); and cash bonuses to researchers.

South Africa's government-subsidy research incentive which includes the DHET, NFF (New Funding Formula) of 2003, contains elements of both the institutional- and individual reward incentive principles (Vaughan 2008: 91-96; DHET 2003). Funding subsidies proportionate to the number of published articles (DHET approved list), and weighed against expected research output and academic staff composition - expressed as DHET-defined *research output units* - are awarded to HEIs (DHET 2014:7-14, Tongai 2013; Woodiwiss 2012: 421; De Villiers 2014). Currently individual HEIs are at liberty to decide on a disbursement policy of awarded research-output subsidy within the institution. Apart from prestigious individual awards for outstanding research, some HEIs follow an individual researcher reward policy and award a predetermined proportion of the subsidy amount to individual academic researchers for every research publication. For example researchers of the University of Johannesburg who publish in international and national accredited journals respectively receive a 70% or 50% subsidy award; North West University increases individual researcher incentives proportionately to the number of publications per researcher per annum: R12 000 for the 1st published article; R16 000 for the 2nd and R20 000 for the 3rd publication per annum (Tongai 2013; Woodiwiss 2012: 424). UNISA, as the main focus of this study, also follows an individual researcher incentive policy that differentiates between international and national accredited journal publications. The disbursement policy of the Universities of Cape Town and Rhodes however advocate indirect incentives to researchers by awarding annual block grants and funding to faculties (Tongai 2013).

1.2.2.4 The monetary value of DHET research output is substantial for SA HEIs

Apart from promoting research with the aim of generating new knowledge, the financial injection that South African universities receive from the government research subsidy is substantial and has huge financial implications for these institutions. The monetary value of one research output unit in 2013/14 was set at R119 027 (DHET[a] 2015 figures). (For the respective periods of 2005/6, 2007/8, 2009/10, 2010/11, 2011/12 this amount gradually rose from R77 606, to R85 023, to R102 604, to R117 144 and to R127 638. Research unit-allocation in 2013/14 was less than in 2011/12 figure Woodiwiss 2012: 424; DHET [a] 2015). If taken into account that a two year gap exists between research output acknowledged by DHET and fund payment to institutions, an estimation of the still-to-be-awarded 2013/14 government article subsidy award is deduced as follows: if the 2013/14 DHET research output unit-value of approximately R119 027 is discounted against the total journal research units accrued for 2012 – as obtained from the *2014 DHET Report on the evaluation of the 2012 universities' research publication outputs* - the financial benefit to universities from published articles paid over in 2015 will amount to at least R1.313bn (11036 article research points x R119 027 = R1 313 581 972) which is a substantial amount. For UNISA this amounts to approximately R97.5m (812.43 article research units x R119 027 = R96 701 105.61 (DHET 2014: 13; DHET[a] 2015)). These figures give a rough indication of the financial contribution of increased article production to South African HEIs in 2015.

The importance of research and article publication for new knowledge generation and continued financial support to research has been motivated in this section: society needs new quality and reliable knowledge towards decision making and development; research generates and avails the correct type of new knowledge to society; and research publication in turn assists in funding future research to ensure the sustainability of the knowledge generation cycle.

1.2.3 The need for quality new knowledge is the concern of the statistical community

Quality concerns

The focus on quality and trustworthiness of knowledge via published articles as argued in the preceding discussion, links very closely to statistics. This angle on the production of new knowledge is suggested in the title of this research, namely, "*Mapping the dynamics of ROP: viewed from a statistical research support perspective".* Apart from providing the tools to analyse and interpret data, the science of statistics strives first and foremost to ensure integrity, quality and reliability of data and knowledge generation. This is of central importance to the statistical community and statistical method (Clayton 2005:218). William Sletzer (2005), who for six years chaired the Committee of Professional Ethics of the American Statistical Association, stated in 2005 that credible information (reliable, ethical, quality data) is of grave concern for the statistical community. Because of the fact that statistics on the one hand stands as an independent science, and on the other as an integral part of scientific methodology - which moves applied statistics into various subject specific fields (Carter, Scheaffer and Marks 1986:260) – quality measures in statistics flows over to quality in other research field and vice versa.

Quality concerns of the statistical community are evidenced in the numerous national and international statistical societies that embed their drive for quality and integrity in practical statistical application in their vision and mission statements. Statistical protocol on ethical and professional conduct stresses statistical responsibility and the consequences of integrity- and ethical malpractice in applied statistics (Sletzer 2005). The voices of esteemed societies that advocate integrity include, for example, the American Statistical Society (ASA 2015; Wong 2009); the Royal Statistical Society (RSS 2015) of the UK; the Statistical Society of Australia (SSAI 2015); and the International Statistical Institute (ISI 2015) to name but a few. In this regard the *Committee on Professional Ethics* of the American Statistical Association (ASA 1999) for example, as early as 1999, expressed their concern in the following statement (*Ethical guidelines for Statistical Practice*):

> Because society depends on sound statistical practice [for decision making] all practitioners of statistics whatever their occupation, have social obligations to perform their work in a professional, competent and ethical manner.

Likewise, the International Statistical Institute website (ISI 2015) carries the message that statisticians should strive to apply

> .. the most appropriate statistical methods [and] foster public appreciation for sound statistical practice.

The Strategy for UK statistics 2015-2020 of the UK Statistics Authority (2014) and the divisions of the Government Statistical Service (GSS) and the Office for National Statistics reiterate these convictions:

> The authority's independent regulatory function [is to] act as guardian of the integrity of the statistical system [and to] advocate the highest standards [and] challenge misuse of statistics (2014:3)

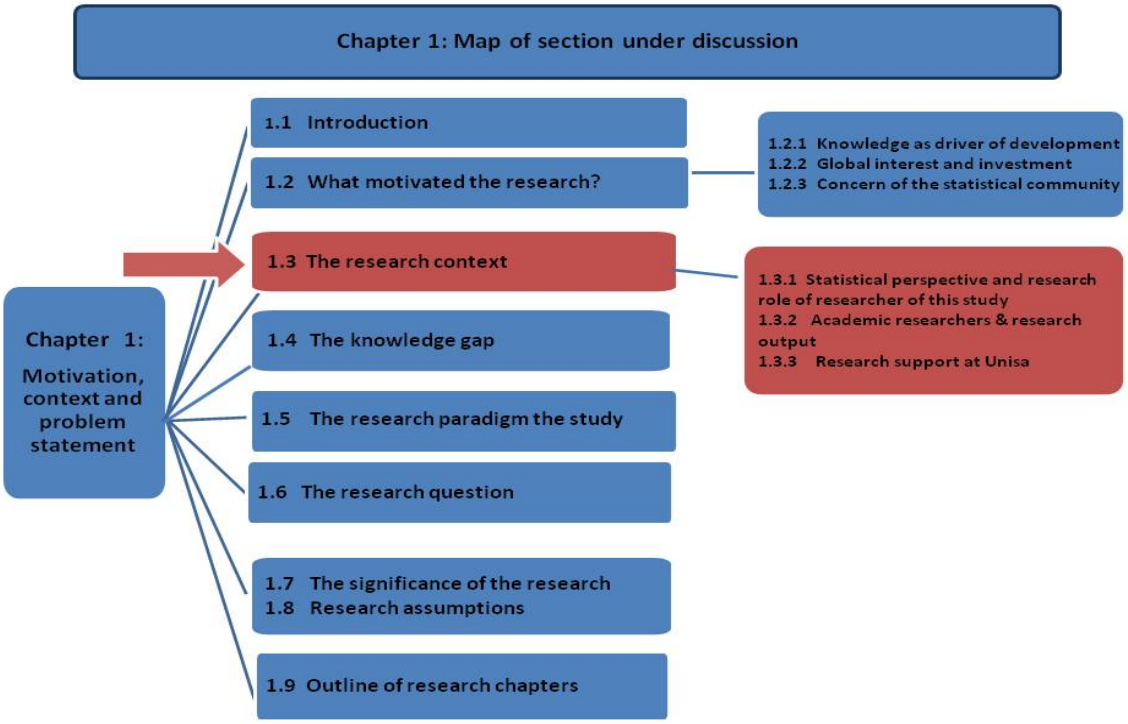
A further initiative towards data integrity is illustrated in the *United Nations Fundamental Principles of Official Statistics* (A/RES/68/261) that guide governments and statistical departments /agencies on their responsibilities in terms of data integrity, confidentiality and appropriate methodology (UN Statistical Commission, 2014).

Further evidence of commitment to quality knowledge is not only portrayed in statistical societies' commitment to integrity – both in professional conduct and in dealing with information, but also in governments' willingness to invest heavily in governmental statistical agencies dealing with official databases. The US Federal Government, for example, in 2005, spent $4.7b on statistical integrity programs (Clayton 2005: 218). Countless examples of similar per country investment in statistics can be listed. Collectively the aim is to ensure relevant trustworthy knowledge.

How this vision is implemented of course directly impacts on research quality. Liston, as early as the 1950s (1956:61,63) stressed that statistics and statistical method is a specialised field and that applied statistics is an indisputable requirement in the research environment. As an applied science in another specialisation fields statistics assists in transforming data (thus information) into knowledge by identifying underlying trends, structure and relationships in data (Giovannini 2005:16; Burgi-Schmelz 2005:140). This process assists in understanding the data and the researched phenomenon. However, identified statistical trends and structure have to be communicated in understandable terms to the researcher for him/her to gain insight and understanding of how the mathematically identified trends or underlying structure translate into events and interaction in the subject specific field. Statistical to subject-specific knowledge transfer therefore forms an integral part of the entire research process. This is ideally realised as statistical centres at academic institutions (Carter et al 1986:260; Hahn and Hoerl 1998:195-200). Although the technical environment of research has changed enormously in the 21st century with regard to easily accessible and user friendly statistical packages – which enable a substantial proportion of researchers to sensibly analyse and interpret their research data - the science of statistics serves to add appropriate techniques and input to intricate application areas.

The above discussion motivated the topic of this research by arguing that global society continually needs new, quality knowledge in decision making and development. It was argued that a major source of this type of new knowledge is availed to interest groups as published articles in quality journals. The argument furthermore indicated that applied statistics is an integral methodological component of numerous subject specific research fields and ensures quality and reliability – which are sought after attributes. In this sense statistics is closely linked to research and research output productivity. The next two sections will contextualise the research and indicate the knowledge gap regarding the dynamics of the production of research output/published articles.

1.3 Contextualizing the study



The provision of new knowledge as published research articles to address the perpetual *knowledge-need* for decision making and development of society forms the basis of this research in *research output productivity*. Why are some academic researchers more productive than others and able to publish their research findings in good time? What events and properties affect 'doing research', writing up the research and publishing successfully?

This section serves to contextualise the research environment in which the phenomenon of *research output* - and the production thereof - is investigated. The section describes how the concepts of the production of *research output* (the research process) and *research output delivery* (research publication) are understood; the positioning of the researcher of this study as research support statistician in a specific academic environment; the academic researchers who do research and publish their work; the link between the researcher of this study, academic researchers and research output; the HEI that forms a major part of this investigative study; and publication requirements within the specific research environment.

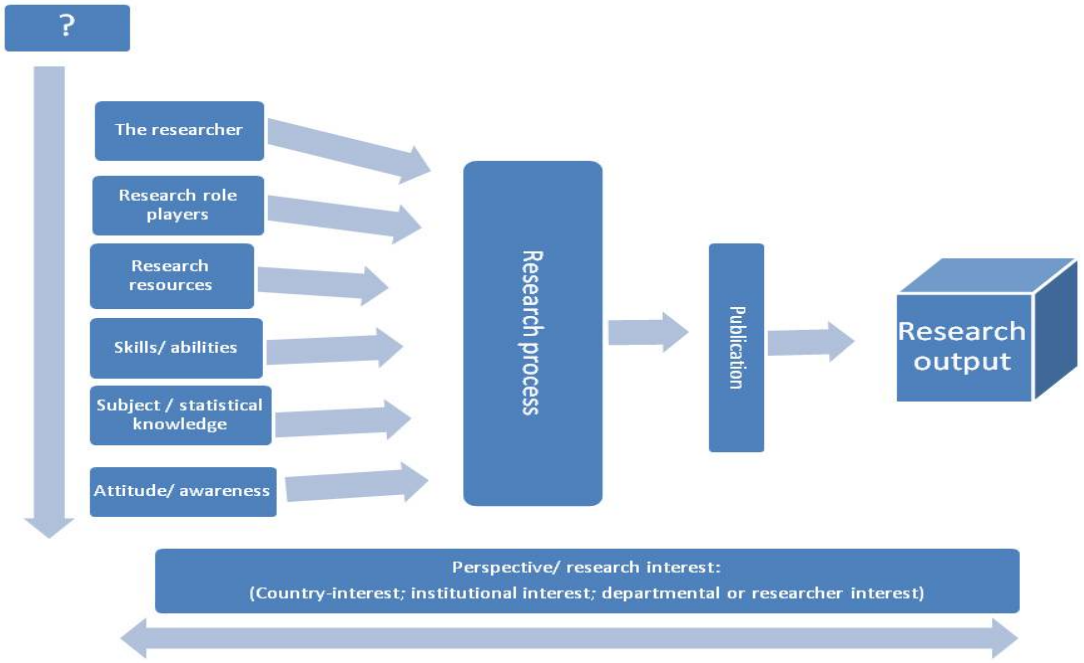
1.3.1 The research process that produces publishable research

To be able to publish essentially implies that publishable research findings have to be generated. Therefore, 'doing research' inextricably forms part of publishing research and involves certain basic, generic elements. These elements include for example a researchable phenomenon (the "?" in Figure 1.5); a researcher/s (in the context of this study, academic researchers); other research role players; a research process; research resources and researchers attributes such as knowledge; skills; and research/ and statistical awareness.

Within this milieu this study asks the question whether - apart from the generic process of producing research findings - actions, events, relationships and/ or role players bring or introduce favourable or

unfavourable research circumstances to the research process that affects the timely delivery of research output. Figure 1.5 presents a visualisation of the process of producing publishable research findings.

Figure 1.5: Components of the phenomenon of research output production



Drilling down to the research process in Figure 1.5, this process is usually[1] characterised by a linear sequence of events/steps. These include a growing awareness of a knowledge gap in a subject specific field that is of concern to the researcher; the formulation of a research topic and research questions; evaluation of the status of existing knowledge on the issue of interest; identification of variables and measureables to inform the research issue; identification, planning and design of appropriate measuring instruments and research participants; research assumptions; an analysis strategy and action plan for research execution; execution and data collection; data analysis and interpretation; write-up of research findings; article submission to identified accredited journals; feedback and response to peer-review critique.

These actions and decisions basically underlie all research undertakings although methodological approach, measurement, type of data and means of evaluating and interpretation vary greatly for different research approaches. The stages of the research process have been discussed extensively in the literature. The work of researchers like Fraenkel, Wallen & Hyun (2014:19-20), Blankenship (2010), Dawson (2009), Kunmar (2014:33-34), De Vos, Delport, Fouche and Strydom (2011), Lacey (2006:17-30); Gerrish and Lacey (2006), attest to this.

[1] The word "usually" has been added to the sentence to distinguish the cyclic rather than linear research process of grounded theory method – the methodology to be followed in this study and which will be explained in Chapter 3.

The literature indicates that researchers split the research process into stages and label the stages of the research process in different ways. In the context of this research the steps of the research process are defined as:

(i) Research question and topic formulation, planning and design
(ii) Execution and data collection
(iii) Analysis and interpretation
(iv) Write-up and submission. (Please refer to Figure 1.6 and Chapter 5).

Figure 1.6: A visualization of the generic research process

This discussion served to position the concepts of the *research process* and the *production of research findings* as inextricably part of the phenomenon of publishing research findings, thus research output.

1.3.2 The research role of the researcher of this study: statistical support services

The statistical slant to this study – as suggested in the title of the thesis[2] – flows from the researcher's involvement in academic research. This researcher serves as consulting statistician in the Research Support Unit (a component of the College of Graduate Studies) of the University of South Africa. The unit supplies statistical support to academic researchers (and post-graduate students) who are doing quantitative or mixed methods research. The researcher of this thesis has served as consulting statistician in this unit for the past 15 years (and prior to that an additional 14 years in a very similar environment at an agricultural research institute). Statistical support implies consultation services during the research process (questionnaire-, sampling-, analysis-strategy design, etc), statistical analysis and programming; and analysis interpretation and report back/write-up of the analyses and findings. In this capacity statistical support, inter alia, includes contributions to academic articles, either as co-author and reviewer or as reviewer of the statistical sections of articles. Such articles are based on the statistical support and -report provided by the unit. This involvement in research brought awareness that some research is published more readily than

[2] Mapping the dynamics of ROP: viewed from a statistical research support perspective

others – even though research attempts may seem equally deserving. Observation from within the support role indicates that various factors and events appear to have an impact on the research process that produce research findings, article write-up and eventual publication. It has been observed, for example, that thorough research planning; proper topic and research question formulation; coordination of research execution/administration; relationships and responsibility-sharing between role players in the research process; English language proficiency; statistical literacy and awareness; selection of suitable journals in which to submit; research, publication experience and writing skills all seem to impact on successful publication. Interest in the research output phenomenon was thus based on statistical support experience in the process of 'doing research'.

Because of the impact and consequences of sound statistical support on effective research, the responsibility and professional integrity of statisticians in consultative research support roles are clearly outlined in the statistical community. International statistical associations and ethical bodies have compiled comprehensive generic listings of the role and contribution of statisticians in the research process. An excellent example is the work undertaken by the International Statistical Society (ISI) as described by Moriguti et al (1992, 227-246). The purpose is to safeguard statistical input in the information infrastructure for ethical and theoretical integrity. These generic listings deal with adherence to an ethical code of conduct, a sound statistical knowledge base, statistical, logical, holistic and strategic thinking, the pre-empting of pitfalls in the research process, IT-, software- and programming skills, the ability to grasp multidisciplinary problem statements and work in this type of environment, consultative and communication skills, writings skills, ability to translate statistical findings into the subject specific language of the researcher, and many more. Hahn & Hoerl, (1998: 197), for example, stress the relevance of these skills in industrial research.

Experience as consulting statistician and the responsibility-role of the statistical society towards quality and reliable new knowledge generation therefore acted as additional and strong impetus for the study. The idea of effective collaboration with and statistical support for the academic researchers that aim to improve their research output was a driving force in deciding on the research topic of this study.

1.3.3 Academic researchers and research output at UNISA

1.3.3.1 The academic researcher

In the context of this study academic researchers refer to academic staff members (lecturers and professors) that either conduct their own independent research (project-approved and ethically cleared) or do research in a supervisory capacity on approved research projects of Master's and doctoral students.

Although statistical involvement throughout the research process is seen as the optimal research-support relationship in quantitative and/ or mixed methods research, statistical support required by academic researchers covers the spectrum from ad-hoc queries on specific statistical issues, to support in different phases of the research process, to statistical support throughout the research process. Specific aspects may include research question formulation; questionnaire design; sampling-, research execution- and data collection principles; analysis strategy and practical statistical analysis; interpretation; report-writing; write-up and editing.

At UNISA academic researchers from various disciplines use the statistical support services of the CGS. Disciplines include education, nursing and health sciences, food sciences, industrial psychology; criminology; computing sciences, business management, criminology, penology, nutrition and more. The level of the research experience; publication experience and skills; and statistical literacy of academic researchers vary from highly skilled and experienced researchers to inexperienced researchers. The research environment of this study includes academic researchers who often work on their own, those who work in collaboration with researchers at other national or international HEIs, or private researchers in industry, etc. Research collaboration is often multidisciplinary.

For the purpose of this study potential research participants were identified as those academic researchers (36) who offered the researcher of this study co-authorship of research articles. These articles required substantial statistical input from the researcher of this study and are regarded as a possible data source in the investigation reported in this thesis.

The stance of the Statistical Support Unit on the relationship between academic researcher and statistician is that eventual responsibility and knowledge-ownership resides with the academic researcher but that the supporting statistician shares the responsibility for statistical input and support provided in the research. The relationship furthermore acknowledges the value and limitations that knowledge of different subject specific fields and expertise bring to the discussion table.

1.3.3.2 Research output recognized by the DHET

Although the DHET (2003; 2014) recognises published academic articles, scholarly books, conference proceedings, and completed Master's and doctoral degrees as research outputs that earn research output units for a particular HEI, published articles in DHET accredited listed journals are regarded as *research outputs* for this study. This decision is based on two considerations, namely the fact that (i) published articles comprise at least 90% of published research outputs in South African HEIs (DHET 2014:25; Mouton 2013; Labuschagne 2014) and would form a representative 'sample' of published research when the phenomenon of the effective production of research output is investigated. Furthermore, (ii) careful consideration of all others forms of research output suggested that the scope of the study would be too broad if articles, books, proceedings and post-graduate degree completion were also included in this study. Too comprehensive an interplay of events would then have to be investigated that would hinder in-depth investigation of any of the events/ or factors (and the dynamics thereof) in a research output model.

According to DHET standards (DHET[b] 2015; NMMU 2015) only articles published in journals listed on the annual list of DHET accredited journals qualify for research output units (and subsequent subsidy) of universities. Thus the published articles that this research planned to include as possible data source in the research[3] were all published in DHET accredited journals that earn research output units for the HEIs. Research output in the context of this study thus refers to published articles in DHET accredited lists.

[3] Grounded theory method – the methodology regarded as appropriate for this study, allows more than one data source to be considered and used as data source in research.

1.3.4 UNISA and research support services (statistics) provided by the CGS

1.3.4.1 Research focus linked to student population and CGS research mandate

UNISA is the largest ODL institution in the southern hemisphere and currently the only ODL HEI in South Africa with in excess of 400 000 registered students for the 2015 academic year. As such the university accommodates a significant proportion of all South African (and foreign) students. For example the 2011 student headcount indicated that UNISA accommodated 35% of all SA university registrations (UNISA 2014). Table 1.1 reports a snippet of the headcount of 2009 to 2011 undergraduate (degree, diploma and certificate registrations) and post-graduate students (Master's and doctoral degree). These figures identify UNISA as primarily an undergraduate HEI. This ODL institution addresses rural South Africa and the African continent's need to bring education closer to its people. This is in agreement with the South African government's mandate to "provide all its people with access to education" (UNISA 2014), striving "towards *the* African university in the services of humanity" (UNISA 2014).

Table 1.1: Doctoral and Master head count compared to total student head count 2009 – 2011

	2009	2010	2011	2012
Honours, post grad diplomas & undergraduate	258 094	286 954	321 685	
Masters' and doctoral students	5465 (2.07%)	6483 (2.21%)	7166 (2.18%)	
Total	**263 559**	**293 437**	**328 851**	**336 286**
Source: Unisa 2013 Annual Report; Bergman 2014; Briefing Report on Unisa: Facts and Figures				

However, as indicated in Figure 1.3, the first strategic goal of UNISA's 2013 Annual Report aims to:

> "Improve academic performance in teaching and learning, research and innovation, and community engagement to enhance institutional impact and student success" (UNISA 2014).

UNISA is strongly committed to advancing research and innovation. To address this objective the College of Graduate Studies (CGS) was established in 2011 with the mandate to focus on, recruit, strengthen and enhance research, post-graduate interdisciplinary student enrolment and uplift research esteem and productivity. Examples of activities and initiatives of the College include recruitment, design and investment in excellent research facilities, -environment and –incentives to attract national and international academic researchers and their expert knowledge; supervisory capacity to post-graduate students engaged in interdisciplinary research (apart from supervisory services provided by the six other academic Colleges of UNISA); a research and research output-centred approach of academic staff of the College; a drive to situate NRF funded research chairs at the CGS (the CGS currently holds three research chairs); incorporation of UNISA Press (and several nationally accredited research journals) in the CGS as publisher of academic books, journals and articles; and consolidation of the UNISA post-graduate student registration system within the College. In creating a research-conducive environment to attract visiting professors and international post-graduate students, research support services are developed within the College and housing/ a research-village for visiting academics is in the design phase. The vision of the CGS is to move UNISA forward towards becoming a research-intensive university.

1.3.4.2 Background of the statistical/ research support unit

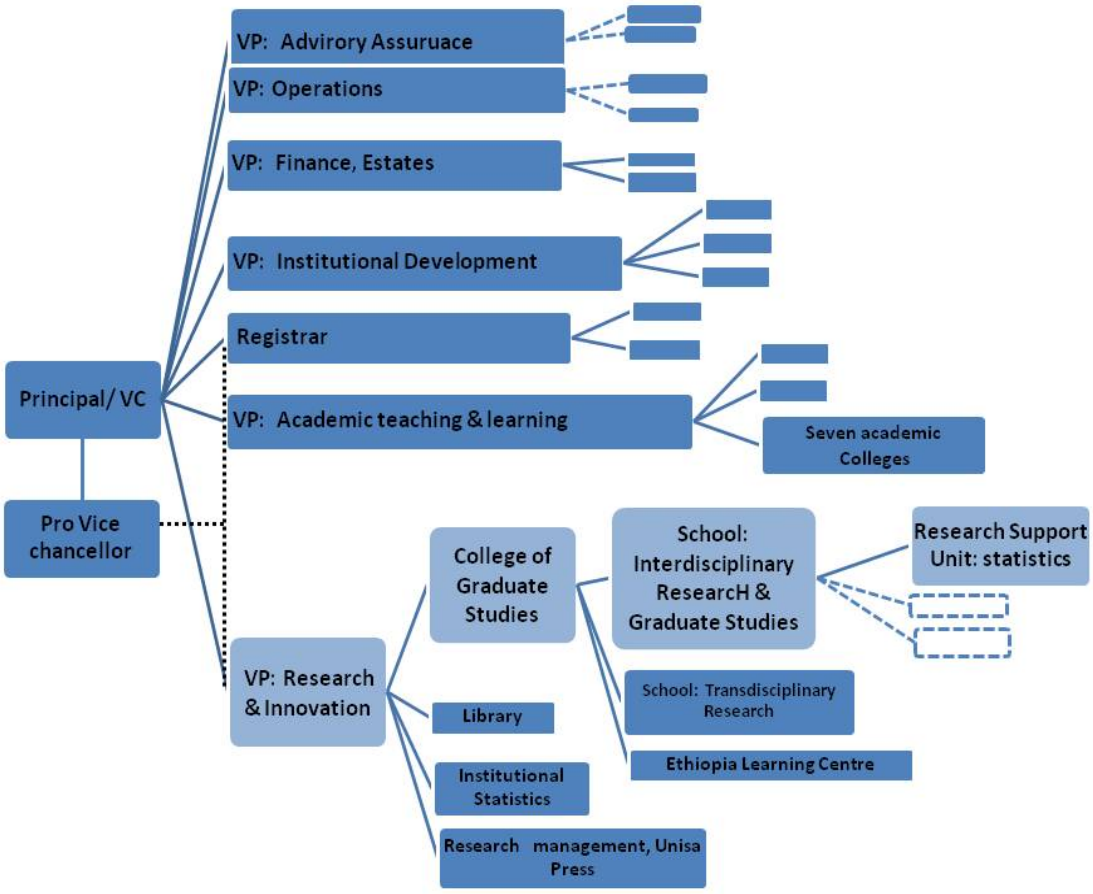
As mentioned in the previous paragraph, research support services are housed within the CGS and are geared towards creating an environment conducive for research. This is illustrated in the abbreviated organogram of the organizational structure of UNISA (Figure 1.7) which positions the Statistical Research Support Unit in the College of Graduate Studies (CGS).

The onset of the 21st century saw a shift in the focus and purpose of the support unit. The unit was originally positioned in the Information and Communications Technology Centre service department of UNISA (please refer to Figure 1.7) as a technical support division because the focus at that stage was more technically orientated towards optimal software package selection and configuration for broader institutional use. Occasional software application support was provided – which included select statistical applications. However the increased demand for quantitative and mixed methods research (and publications) resulted in an increased demand for more and more specialised statistical support in quantitative and mixed design applications.

The increased demand can be attributed to several factors, for example (i) promotion incentives were more closely linked to research output; (ii) the 2003 NFF incentive (DHET 2003) for published research per HEI was linked to an expected research outcome per academic staff member (*normed* output criterion) and actual output figures thus acted as motivator to increase publication output;(iii) more national and international journals were added to the DHET list of accredited subsidy approved journals (more journals to submit articles to); (vi) the financial gain South African HEIs earned from research output credits; (v) growth in student enrolment (which includes post-graduate research); (vi) and the consequential appointment of more academic staff (who also do research); (vii) growing demand for and focus of academic journals on quantitative and mixed method research findings published.

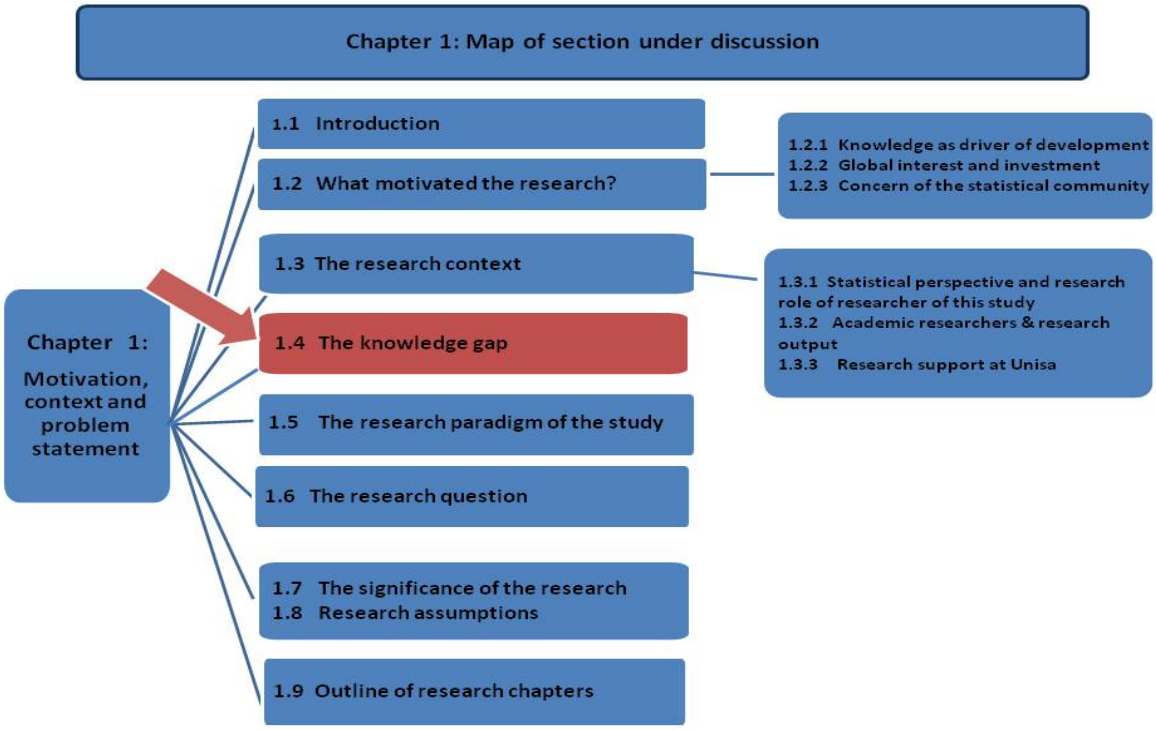
As motivated in the preceding paragraph the increased demand for applied statistical support for academic researchers changed the character and purpose of the original support centre of ICT and resulted in the establishment of an independent Statistical Research Support Unit within the CGS. At present one-full time statistician and one contract statistician service the unit. The appointment of additional statisticians is under serious investigation. The six academic colleges of UNISA (Figure 1.7) also appoint independent consulting statisticians for their research needs and an overarching statistical division for consulting statisticians from different colleges is under investigation. Whether the overarching body will be incorporated within the planned virtual support service division of the CGS is still speculative at this stage.

Figure 1.7: Organizational structure of UNISA, indicating the position of the Statistical Support Unit within the College of Graduate Studies (Source UNISA Annual Report 2013)



The motivation for this investigation of the phenomenon of *effectively producing and publishing research*, along with the contextualisation of such an investigation, served to introduce the reader to research topic of this study. However, the feasibility of conducting the research has still to be verified against existing research knowledge to ensure that newly acquired knowledge in this field will address a gap in existing knowledge, and, that such knowledge will contribute towards the betterment of the field of research, namely the *delivery of research output as published articles*. The previous sentence then explains the title of the next subsection, namely a discussion of the gap in existing knowledge on how to *map the dynamics of effectively producing research output - as published articles - as perceived from a statistical support perspective*.

1.4 Knowledge gap



Section 1.5, to follow, will indicate that this study follows a grounded theory methodology and will explain the reasons for this decision. Section 1.5 also relates to Chapter 3 that discusses grounded theory method (GT) methodology. Grounded theory and grounded theory method (GTM) are mentioned at this stage to explain the format of the *knowledge gap* discussion in this section, Section 1.4.

The conventional structure of a doctoral thesis usually incorporates a discussion - and literature review - on the topic being researched in Chapter 1. This then serves to indicate that limited knowledge on the specific topic exists and additional research is justified. In other words a gap in existing knowledge is identified. In GTM the sequence of thesis-presentation is on occasion compromised owing to GT principles (discussed in Chapter 3). The discussion of the knowledge gap is such an occasion: Chapter 2 to follow will indicate that during the early phases of the development of the method of grounded theory, the timing and placement of an initial literature review was a contentious issue. This was due to the GT principle of an 'open mind/ or clean slate' approach (Glaser and Strauss 1967) to data events that suggest theory-emergence in subject specific fields where little research had been conducted (Chapter 2; 2.1, 2.4). Chapter 2 will also indicate that this issue was resolved in later years. The mentioned chapter will indicate that if the purpose, depth, and format of an initial review are carefully considered, an initial literature review will not violate the *open-mind* principle and, at the same time allow researchers to motivate a knowledge gap in existing literature. For this reason an abbreviated discussion of the knowledge gap and literature-review findings of Chapter 2 are included in Section 1.4 - to conform to conventional thesis-presentation format (e.g. Nenty 2009). The reader will observe that the complete initial literature review and findings are reported in the second half of Chapter 2 (Section 2.6) following Section 2.4 of Chapter 2

which indicates how the timing of the initial-literature review-debate has been resolved in recent years.

The abbreviated discussion of Section 2.6.2.2 (reported in sections 1.4.1 to 1.4.4. below) will indicate that previous research studies have investigated events that affect *research output productivity/ production*; *article publication/productivity*; and *research output*[4]. The literature review in this regard came to a number of insightful findings on the ROP impacting effect and the modelling of these effects. These findings identify a knowledge gap on ROP theory that this study envisions addressing. The findings support the unique approach that this research aims to follow: a practical research process and statistical support perspective. Subsection 1.4.5 furthermore explains, using the literature, why a ROP knowledge gap from a research process and statistical support perspective exists.

1.4.1 Singular events or factors; and sets of events or factors that affect publication of research

Prior research has identified numerous single (and singular) events or factors that affect ROP. Such a list includes English proficiency (Vasconcelos, Sorenson and Leta 2009); journal editors' influence (Crane 1976); peer reviewers (Publishing Research Consortium (PRC) 2008); publishing standards (Ellison 2000); positive research results that get published more readily (Fanelli 2010); grant funding (Jacob and Lefgren 2011);); incentives (Tongai 2013); entrepreneurs (Lowe and Gonzales-Brambalia 2007); inventions and patents (rather than write-up of research findings) affect ROP (V Looy, Callaert and Debackere 2006); human capital investment (Rodgers and Neri 2007); appointment type (Bland, Center, Finstad, Risbey and Staples 2006); faculty attitude (Monroe 2011); academics' seniority (Mishra and Smyth 2014; 2013); research/teaching workload ratio (Ramsden and Moses 1992); international exposure (Plume 2011); life-cycle of academics (Levin and Stephan 1992); attributes of perfectionism (Charbonneau 2011); numeracy skills of researchers (Gibbs 2010); mentoring (Cohen, Sherman, Kiet, Kapp, Osann, Chen, O'Sullivan and Chan 2012); academic consulting (Perkmann and Walsh 2009); collaboration (Lee and Bozeman 2005; Abramo, D'Angelo and Cota 2009; Carillo, Paganini, Sapio 2011); research resource centres (Mji and Glencross 2002); quantitative methodology proficiency (Hanson, Hull and Williams 2010); statistical literacy (Williams, Hodgkinson and Payne 2005); statistical thinking (Dansfield, Fisher and Vogel 1999); statistics (Webster 2001; Reston 2007); and statistical support (Omar, McNally, Amber and Pollock 2006; Ponomariov and Boardman 2010; University California's Statistical Computing Centre 2013).

At this stage, accessed information was compared against the objective/s of this study and questions were asked of accessed data such as, whether only a selected, singular factor was investigated or whether more independent factors or subsets of factors/events were investigated for their effect on ROP?; if more factors were investigated what type of relationship/s were investigated?; why was the study undertaken?; what was the vantage point of the researcher of the specific study?

These measures served to structure reasoning concerning accessed literature to identify knowledge gaps of relevance to this research. Consideration of mentioned questions revealed that subsets of

[4] Chapter 2, section 2.6.2.1 will indicate how the initial review assisted in labelling the research topic as "research output productivity"/ ROP

factors/or events were often investigated; that the purpose for investigating research output varied; and that the vantage point of research to ROP also varied. The literature results on these deductions are reported in b) to d) below.

1.4.2 Subsets of related factors or events that affect the phenomenon of ROP

Articles on some of the literature reviewed report on the effect of groups of interrelated factors or events that impact ROP. These groupings suggest more comprehensive factors (for the interim, the groups of factors are labelled 'group factors' in chapter 2). An example would be the *publishing process* that includes the factors/events of the editor, peer reviewers, guidelines and policy; or *faculty environment* that includes attitude, appointment type, seniority and life cycle, and the ratio of research/teaching workload. Reference to these types of studies include,

- Shin and Cummings (2010; Shin 2011) who refer to *Faculty effect* (faculty mission, faculty type, faculty discipline, research time allocation, academic ranking, training); *institutional effect* (institutional climate, institutional support, institutional characteristics), *biographical properties* of researchers (age, qualifications, attitude, personal preference, qualifications, workload) and *skills* (research skills) that affect ROP.
- Bland, Center, Finstad, Risbey and Stapels (2006) refer to factors of *supportive research environment* (decentralised organisation, recruitment of research-driven staff, culture of research, positive group culture, mentoring, communication, resources, time allocation, rewards, professional development); *faculty member characteristics* (motivated, skilled, knowledgeable, internally and externally orientated, scholarly working habits); and *faculty leadership qualities* (highly regarded scholar, research orientated, assertive-participative leadership style, initiates structures to monitor and support research).
- Ryan and Hurley (2007) list a *research environment* group of events (morale, information flow, involvement, supervision, teamwork and meetings).
- Bland and Ruffin (1992) refer to a *research productive environment* group factor (goals, research emphasis and culture, effective recruitment, assertive-participative governance, researcher group-size, decentralised organisational structure, reward system, communication and team culture, adequate resources and good leadership) that affect ROP.
- Jung (2012) defines *demographics (*gender, years experience); *workload (*time allocated to research, time allocated to teaching); *research style (preference for* research, collaboration, applied research) and *institutional characteristics* (performance-based management, commercial orientation, shared governance).
- White, James, Burke, and Allen (2012) refer to *attributes of researchers (*contentiousness; regard for research; time management skills; career promotion history; available research support; assistance of doctoral students; allotted research time; teaching responsibilities; high research performance faculty).
- Alghaniam, S.A. & Alhamali, R. (2011) defines r*esearcher characteristics/or biographic profile* in terms of gender, age, years professional experience, academic rank, administrative workload, post-grad supervisory responsibilities and research training received in the previous two year period. The group factor was defined from a medical researcher's vantage point.

1.4.3 Research objectives and vantage point assumed in independent studies

Alghaniam and Alhamali in the previous paragraph mention the medical vantage point of their research. This answers to the vantage-point question asked of accessed literature on ROP and indicates that researchers in the reviewed literature approach their research from different vantage points (or perspectives) and for reasons different from the intent of this study. Vantage points assumed in accessed literature were as diverse as financial auditing agencies, institutional management, institutional interest, faculty interest in assessment of research output in medical health in the United Kingdom, nursing in Australia, Information Technology, and a global assessment of research standing of higher education institutions compared against baseline research universities of excellence.

The accessed literature does not seem to report research conducted from an operational research process vantage point that involves statistical support services: in other words, how research is actually executed and how the 'production process' affects the publication of articles. This research perspective lends a unique angle to the study under discussion and differs from accessed research on research output and the production thereof. The section of *Literature and the statistical support perspective* will further inform this deduction.

The findings of Chapter 2 (Section 2.6.2.2.) will also indicate that the objectives for studying ROP differ from those of the current study: in accessed works the focus frequently appears to be financial addressing funding problems in medicine; optimising research spending; predicting future productivity; a financial gains-and-loss perspective; optimum faculty management and productivity; global research status or positioning re efficiency; advantages of global research positioning; research standing; and the like.

1.4.4 Relationships and modelling of ROP

Research in this study intends to identify and model the impacting effect on ROP. The initial literature review (Chapter 2) therefore looks at how independent studies related and modelled impacting effects on research output and research output productivity. This would indicate whether a knowledge gap exists on theory of impacting effects on ROP. The statistical research *support perspective* in the *research process environment* would have to be taken into account in such an evaluation.

The initial literature review revealed (Chapter 2 section 2.6.2.3) that:

- Only a limited number of studies report on theoretical models of research output productivity. One such an example is reported by Kern (2011) who models the effects of funding; investigator/researcher quality; passion; analytic accuracy; a research mix of novelty, incremental advancement and confirmatory studies; and efficiency of the research environment into a multiplicative-effect ROP model. The research was conducted in a medical oncology context with the aim of increasing oncology financial support via increased ROP. This research did not investigate the research process of producing publishable research and did not model the effect of the research process and statistical research support.
- Bland, Center, Finstad, Risbey and Staples (2005) report on a validation study of a ROP model (Bland 2002) which explains the impacting effect of individual-, institutional and leadership characteristics (2005:227) in a medical research context (University of Minnesota Medical School,

Twin Cities). The purpose was to predict research productivity to improve faculty research standing. The only events of factors investigated in this study that directly link to the *research process* (the departure point of the study under discussion) were research skills and professional communication, which once again indicate that the modelling of impacting effects on ROP has not been investigated from the perspective that the current study intends to follow.

- The research by Drennan, Politis, Hyde and Clark (2012) suggests a relational model that explains the effect of *demographic-*, *individual academic-* and *institutional variables* (group factors) in ROP in Ireland's educational system. Their research is still ongoing and a predictive, linear regression ROP model is anticipated. The actual producing of publishable research, and thus the research process environment, does not form part of the impact effects investigated. It is interesting to note that the inductive-towards-deductive theory development approach that is to be followed in the research of the study of this thesis differs from the deductive-towards-inductive approaches of the listed studies.

This summary of the literature review presented in Chapter 2: Section 2.6 shows that the research under discussion assumes a unique approach to ROP investigation and furthermore motivates the knowledge gap that this study will address. In this regard the knowledge gap is defined as theory development of impacting effects on ROP, investigated from a practical research process- and statistical research support-perspective.

1.4.5 What the literature reports on a statistical support perspective within the research process

The question might well be asked why the phenomenon of research output productivity has not been investigated from the perspective of research support statisticians within the research process environment. This can in part be explained by Dobson (herself a statistician) who discusses this question in a classic paper on the role of the statistician in research in the 1980s. She is of the opinion that because statistical services are rendered to a diverse field of research applications, and because each field requires different roles and responsibilities from the body of consulting statisticians, statisticians are thinly spread and occupied with providing their services to these disciplines. Moriguti et al (1992:229) affirm that statistical capacity is limited with the obvious outcome that the statistical body will be primarily concerned with service delivery and that their literature voice is seldom heard (Dobson 1983:276).

Scarcity of statisticians and misconceptions re the support role of statisticians

Apart from the statistical capacity issues, misconceptions relating to the role and responsibility of the research support statistician and the consultative process itself, add to the reality that a practical statistical perspective on 'doing research' is seldom reported in the literature. Perceptions and misperceptions on the role of the supporting statistician and statistics are illustrated in several narratives taken from the literature. Fuentes (2009:57) for example – herself a statistician – defines statistics as:

> The scientific application of mathematical principals to the collection, analysis and presentation of numerical data.

This definition suggests number crunching and number crunchers, not active support participants in the research process. The description of a statistician in the 2011 Occupational Outlook Handbook

(Bureau of Labour Statistics, 2011: Statisticians) lends a more participative slant to statisticians by defining statisticians/research support statisticians as:

> People that apply their specialised statistical (and mathematical) knowledge to the design of surveys and experiments; the collection, processing and analysis of data; and the interpretation of analysis results in relation to the specific field of research.

However, the above definitions fail to recognise that the statistician's most important contribution towards research programmes often lies in support towards creating the logical structure of the research process – from the planning and design phase up to the analysis, interpretation and write-up of research results. To this effect, Donaldson and Gray 2005; Svensson 2001: 26, 30; and Bishop, Petersen and Trayser (1982:387) state that this type of structuring-support suggests a continual and collaborative teamwork relationship in research. Donaldson and Gray (2005) elaborates on this aspects by indicating that statistical research support can either take the form of a collaborative- or a consultative research support approach: consultative support implies 'once off' visits to and service/s rendered by the statistical support unit to do the 'number crunching business'; collaborative support includes research support that suggests a role-players-in-a-team approach in which role players assume responsibilities, are continually informed on the research, acknowledge one another's field of expertise and jointly contribute to the research effort (Templin and Hoffman, 2001:10). The role players are active contributors throughout the entire research process. Dobson states:

> The solution is to have statisticians as colleagues and fellow investigators. Experience suggests that this works effectively provided that the roles of the collaborators are well understood. (Dobson 1983: 274)

A collaborative approach suggests a kind of selfless approach towards the quality of the end product. The academic researcher's perspective of the type of research support required presents as one of the great challenges of effective statistical research support.

If the more conservative, consultative approach towards statistical support is embraced misconceptions more readily arise because support is perceived as a 'service point' or 'push button' for 'downloading data and collecting results' (Donaldson 2005). Misconceptions in this regard can quite possibly be attributed to the shortage of statisticians on the one hand and on the other the general availability of what literature has labelled 'canned' user-friendly statistical software packages (Hahn & Hoerl, 1998: 195; Moriguti, Diggle et al, 1992: 227). The relatively easy access to comprehensive statistical analysis techniques often creates the impression that the 'service centre' (aka statisticians) only need to execute a standard/automatic procedure that produces results. The statistical expertise to ensure quality, reliable results - based on adherence to statistical assumptions and axioms - is overlooked. Statistical activity is perceived to be a two-minute job. Misperceptions of this nature assumes a kind of automated IT statistical decision-making intelligence and conveniently shifts the responsibility of statistical discriminatory skills and reasoning from the researcher/or research team to a mechanised software systems approach (and statistician).

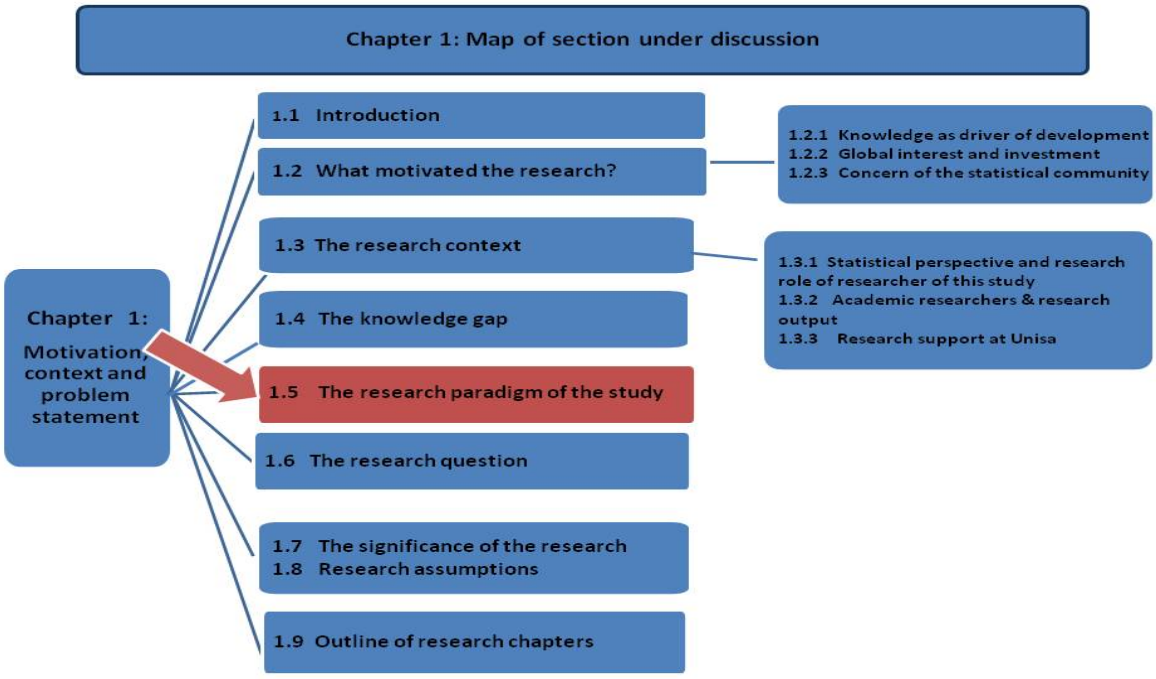
Responsibility roles linked to statistical (statistician) and subject specific knowledge (researcher)

The misconceptions regarding statistical research support indicated above once again echoes the central theme of the chapter's motivation, namely the provision of reliable information input (via published articles) into the universal information system. Role players in the research process have the critical responsibility of adhering to scientific discretion and insight in providing reliable and

trustworthy new knowledge to society. Responsibility of this nature implies scholarly insight and scholarly development.

Section 1.4.5 elaborated on the statistical research support approach to this study and listed misconceptions re the most effective use of statistical support services in the research process. The discussion suggested that misconceptions may prove to affect the quality and publishable value of research findings. The literature indicated reasons why the perspective of research support statisticians on ROP has not been reported in the literature, which confirms a knowledge gap in ROP research. This section can therefore conclude that a study on factors that impact the production and publication of research, explained from the perspective of the research support statistician, in the research process, is justified because this has proved to be a little researched field.

1.5 The research paradigm of this study



1.5.1 The research philosophy within the research paradigm that positions research

A philosophical position is required to justify, guide and underpin any research endeavour (Saunders, Lewis and Thornhill 2012:108). One might well ask what this statement implies and what constitutes a research philosophy. A research philosophy can be crudely defined as the way a researcher (i) perceives the world/or reality (ontological assumptions, or theoretical *perspective,*[5] as labelled by Crotty 1998: 5) and (ii) what constitutes knowledge/ or information/ or data (epistemological convictions). In other words these assumptions (research philosophy or theoretical framework, Saunders et al. 2012:108; Kelly 2008) determine what types of knowledge will be seen to be 'useable' by the researcher and what type of reality the researcher will aim to investigate. The

[5] Crotty prefers to refer to a theoretical perspective rather than ontological belief/ assumption (Crotty 1998:11). Research philosophers use different terminology for very similar concepts.

assumption therefore influences how research is done (methodology) and how results are interpreted (theory developed or evaluated). Since theory is regarded/defined as an organised structure of how concepts, constructs, and the relationships between them - set out in proposition/s - explain a phenomenon (Homas 1964; Johnson and Christensen 2007; Tavallaei and Abu Talib 2010) it is obvious that explanation (theory) will be influenced by the philosophical underpinnings and beliefs that the research embraces.

The previous paragraph touched on the components of the research paradigm that underlie all research and refers to a global term that encompasses the epistemological, ontological (theoretical perspective or research philosophy), method and methodology of research (Kelly 2008: 33; Saunders et al. 2012: 106)). If these assumptions are specified, a basis exists to justify developed, verified or improved theory. This will also support decisions on research- and analysis strategy, execution and interpretation of results. In other words, before detailing methodology and research method and technique, the assumption and beliefs (research philosophy) that will justify the use of method and methodology have to be finalised.

1.5.2 Research paradigm determination: Crotty 1998

The above argument suggests a hierarchy of decisions to be taken in the research process which together form the research paradigm of the study. Crotty (1998:2) pictures paradigm-determination as four steps set out in four questions. These are listed below and illustrated in Table 1.2. The questions are:

- Epistemological assumption: What is regarded as knowledge? How do we know what we know?
- Ontological assumption: What is regarded as reality or truth?
- Methodology: What plan/ strategy will be followed to execute the research?
- Methods: Which methods/ techniques will be utilised to execute the research?

Table 1.2 indicates that a hierarchical decision process is followed – working from left to right in the table – firstly, deciding on an epistemology suited for the research context and researcher beliefs; secondly, on the combination of epistemological and ontological assumptions that suit the research context and researcher beliefs (research philosophy or theoretical perspective); and thirdly, with philosophical assumptions determined, deciding on the research methodology and techniques/ methods that will fit the philosophical underpinning of the study. For the present study this logical way of determining the research paradigm placed the envisioned grounded theory methodology and grounded theory set of methods within a *constructivist-pragmatist* research philosophy or theoretical framework (Bryant 2009; Evans 2013:46). The specific paradigm is indicated by blue arrows in Table 1.2. Chapter 3 discusses in detail the grounded theory methodology as the methodology of choice for this study and elaborates on the philosophical underpinnings of grounded theory. Chapter 3 will indicate that GT methodology has been associated with different philosophical stances depending on researchers' epistemological and ontological convictions. For example classic GT is underpinned by an interpretivist perspective that embraces both pragmatism and symbolic interactionism (Glaser and Strauss 1967, Glaser 1978); while constructivist GT embraces a more interpretivist-constructivist approach (Charmaz 2011). Glaser, the initial designer of GT methodology, on the other hand declared the methodology free of philosophical underpinnings (Glaser 1999:836-845).

Table 1.2: Determining the research paradigm of a study: hierarchical decisions (1 to 4) on epistemology and theoretical perspective, prior to decisions on methodology and method selection

1. Epistemology Main streams (What is knowledge: what is data , how interpret)	2. Theoretical Perspective** Research philosophy (epistemology/ontology)	3. Methodology (strategy of research execution & analysis)	4. Methods
Objectivism (reality exists apart from any conscious actions)	Positivism	Experimental research	**Sampling**
	Post positivism		Measurement
			Questionnaires
Constructivism (Truth/ reality comes from interaction with and experience of the world)	**Interpretivism** • Symbolic interactionism • Pragmatic • Phenomenology • Hermeneutics	Survey research Phenomenological research Heuristic enquiry	Observation Interview Focus group Case study Narrative
	Social constructionism	Ethnography	Statistical analysis
	Critical theory/ constructivism	Action research	Theme identification
	Feminist	Feminist stance research	Cognitive map
	Realism		Document Analysis
			Content analysis
Subjectivism (truth/ reality does not come from interaction but the interpretation the object impose on the subject)	Structuralists	Grounded theory	Conversation
	Post structuralists	Discourse analysis	Case study
	Post modernists etc	etc	Ethnographic methods Etc.

*Broken lines indicate: that an epistemology can underpin a variety of theoretical perspectives (and that research philosophy encompass perception of reality); furthermore, with a methodology selected, various methods can be selected within a methodological approach

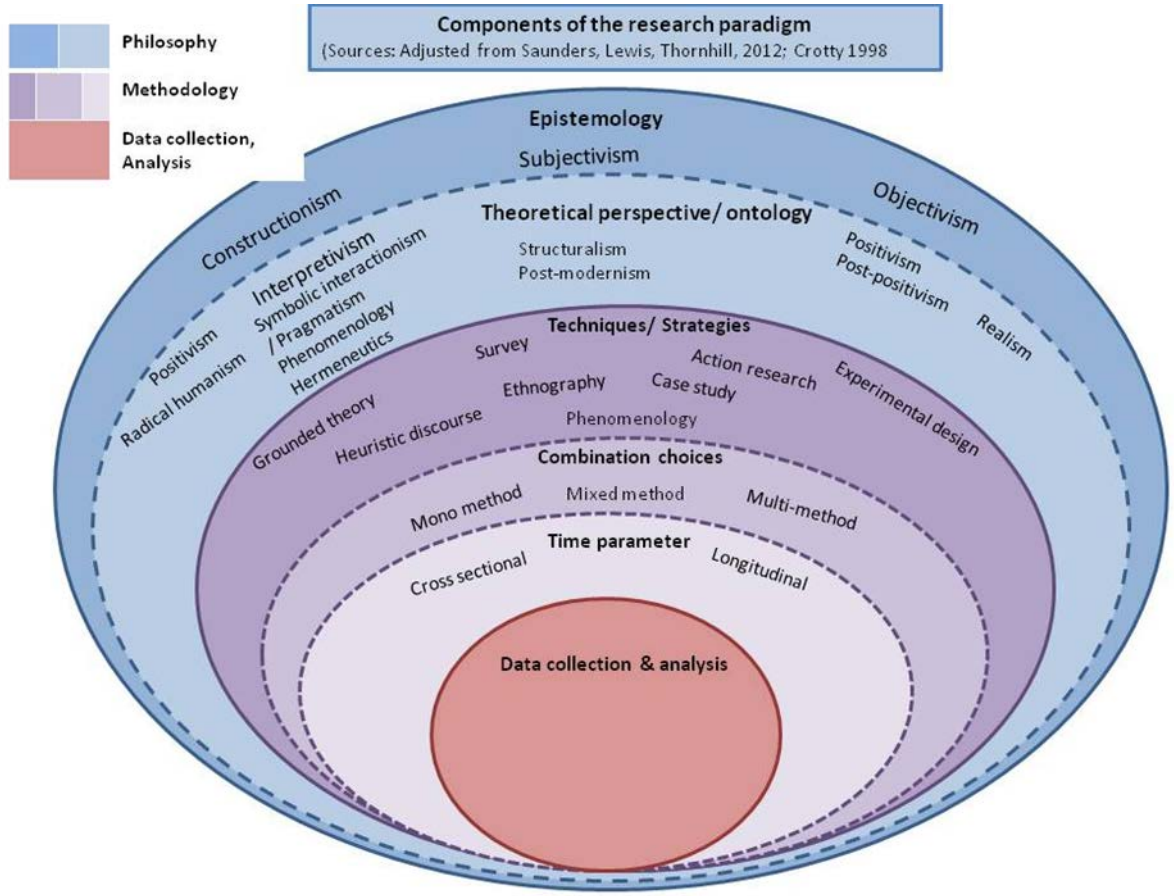
** Crotty (1998: 7-10) indicate that naming conventions for theoretical perspectives/ ontological convictions are not unique and that research philosophers may name/ label the same direction of thought differently

1.5.3 Research paradigm determination: Saunders, Lewis, Thornhill (2012)

Researchers use different guidelines to determine and illustrate their choice of research paradigm suitable within the context of the specific research and researcher beliefs. Saunders et al. (2012: 108), for example, illustrate the concept of a research paradigm in terms of a research onion, depicted in Figure 1.8 below. The different components of a paradigm are colour coded in Figure 1.8 to indicate that the 'outer layers' or components of the onion embrace 'inner layers' or components

of the research paradigm and in this way illustrate the hierarchical structure of the research paradigm.

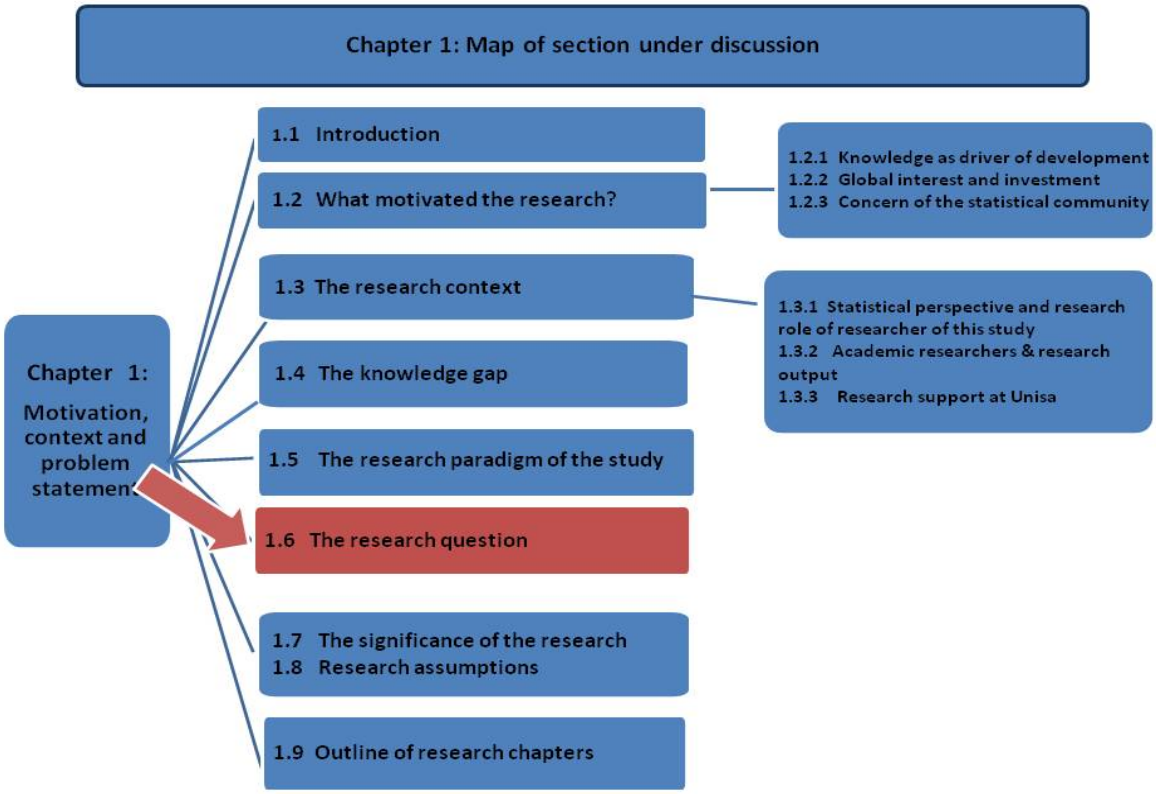
Figure 1.8: The research onion illustrating the generic research paradigm.



1.5.4 The methodology-component of the research paradigm: grounded theory

The above discussion introduced the component of the philosophical foundation/theoretical framework of the study and in the process mentioned grounded theory as research methodology. In the context of this study a GT approach seemed a very appropriate methodology for several reasons, primarily that – as indicated in section 1.4 - a knowledge gap on the dynamics of ROP exists and GT methodology is ideally suited in a research context where paucity of knowledge in the field of investigation exists (Schreiber 2001; Chapter 3). The additional attractive features of this methodology are the ability to develop theory as part of research execution; and flexibility with regard to options of data sources, data types (qualitative and quantitative) and analysis techniques. The features of grounded theory methodology that make it an attractive option for this study are discussed in detail in Chapters 2 and 3.

1.6 The research question and aim of the research



1.6.1 The initial research question

The *new knowledge* argument of this chapter introduced the research topic, namely academic article publication or research output productivity[6]. By publishing research findings new knowledge is availed to society. As indicated, the knowledge has to be accessible when required. This implies timeliness. A variety of factors can however delay publication and therefore access to new knowledge. Of interest to this study are the events (factors) that impact on the delivery of research output as published articles. By contextualising the research (Section 1.3) it can be deduced that interest in article productivity originated from statistical support interaction with academic researchers who publish.

Section 1.4 indicated that the phenomenon of *research output productivity* in the context of this study has not been researched extensively. The fact that little research has been done in this field implies that this investigation is not backed/supported by an already established theory and theoretical framework of *research output productivity*. Theory will have to be developed in the current research. As indicated in Section 1.5, grounded theory offers a methodology that develops theory as part of the research investigation and is ideally suited to little researched subject areas[7].

[6] True to grounded theory principles the research topic is refined as research advances – this is discussed in Section 2.6, Chapter 2.

[7] The discussion of GTM in Chapter 3 will indicate that GTM is an appropriate theory developing methodology in research areas where limited research has been done

The principle of theory that emergence during research execution (to be discussed in Chapter 3) distinguishes GT from more conventional research methodologies. A consequence of this assumption is the unique cyclic sequence of research planning, execution, analysis and inference-deduction processes to conventional (linear sequence) research methodologies. Research question formulation and research topic formulation in GT are also affected by this property. Protocol of conventional research methodologies requires that the research question/s be stated in detail in the introductory chapter of research theses and that the formulation of these questions remains unaltered throughout the study (since the purpose could be for example to validate existing theory). In GT application however, where little is initially known about a phenomenon and GT assumes that theory develops / emerges as analysis and data collection progress, the formulation of research question/s is initially done in a very general manner and detail is only provided in more advanced analysis cycles as theory development progresses and more knowledge is acquired (refer to Sections 3.2; 5.1.2; 6.3.1.3; 6.3.2.3 and 6.3.3.3 in Chapters 3, 5, and 6). As Willig (2013: 72, 74, 75) comments, the initial research question should be stated in a descriptive way to identify the research phenomenon and should ideally not suggest assumptions pertaining to this phenomenon. Bluff (2005:150) agrees that the research question should initially only serve to identify the phenomenon and should, in the initial stages be inclusive of a broad research field. Willig (2013:72) agrees with this and stresses that initial research question formulation should be open-ended and rather guide towards action and processes than towards conditions. True to GT approach the initial research question of the current study therefore asks:

How do research-related events and processes interact with research output delivery*?*

In the context of this study, research output is defined as the publication of academic articles in accredited journals.

1.6.2 The absence of a stated research aim

Because of the angle of involvement of this researcher in research and publication, namely a practical, hands-on and grassroots involvement (where the research-practices of other researchers are observed on a daily basis), the objective of the study is to identify and describe the dynamics of the events that impact on research production and the delivery of research output within the research process. However, the dynamics of research output production is not the sole purpose of the study: knowledge should be availed to practising academic researchers and institutional management. By availing practical knowledge in a scientific format to the research community and to management - and so facilitate a favourable research environment for researching staff - the study aims to create awareness and understanding of the dynamics that underlie the production of research output and the barriers experienced. Understanding and statistical awareness in both the research community and management can contribute towards a synergy of effective support in the research environment and serve to inform and support researchers to align their research to best-practice research principles.

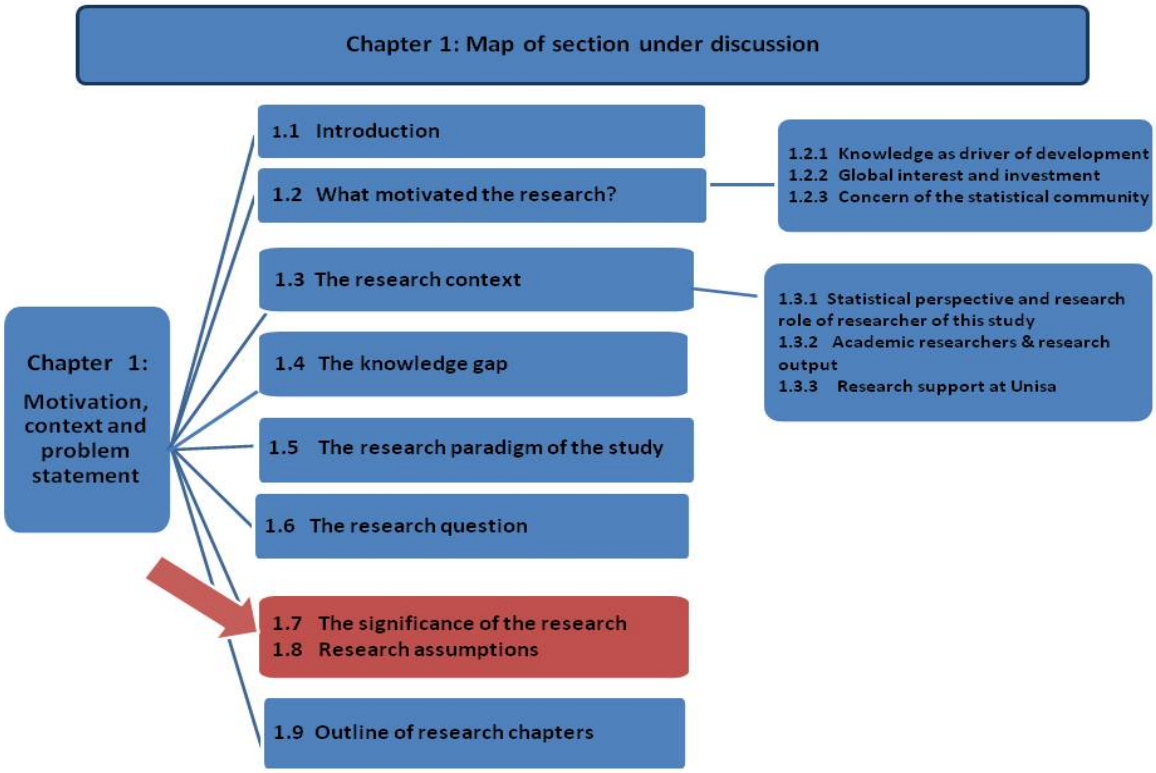
1.6.3 Omission of the research objectives

The open-minded assumption of GTM, along with the GT principle that the data will describe the phenomenon under investigation (and thus theory development) and should not be guided in a

direction other than what the data dictates, implies that, contrary to conventional research methodology, research objectives are not formulated in initial GT implementation. Initially formulated research objectives may be experienced as influencing/ or steering theory development in a direction not dictated by collected data. This may inhibit the process of discovery (Bluff 2005:150; Strauss and Corbin 1998).

To avoid the introduction of possible bias into the research, this study therefore refrains from formulating initial research objectives. The GT principles and assumptions referred to in the previous paragraph are discussed at length in Chapter 3.

1.7 The significance of this research



The significance of this research lies in the potential of the findings to promote a better understanding of and appreciation for good research practice. Sound research practice can be effected through a greater awareness of/ and support of events/ or factors that have been identified in the research to be counterproductive to the production of research output.

1.8 Assumptions of this research

Several assumptions that underlie the research described in this thesis were mentioned in different sections of the chapter and are consolidated in this section. With reference to the research methodology selected for this study (Section 1.5), the following are regarded as fundamental to this research, namely:

- The selection of GT as suitable research methodology was based on the assumption that *research output productivity* is a little researched area if viewed from the perspective of research support

statisticians. Section 1.4 argued, by means of a literature review (investigated in more detail in Chapter 2 as well), that such a knowledge gap exists. The suitability of the choice of GT as research methodology is therefore based on the assumption of the existence of a knowledge gap.

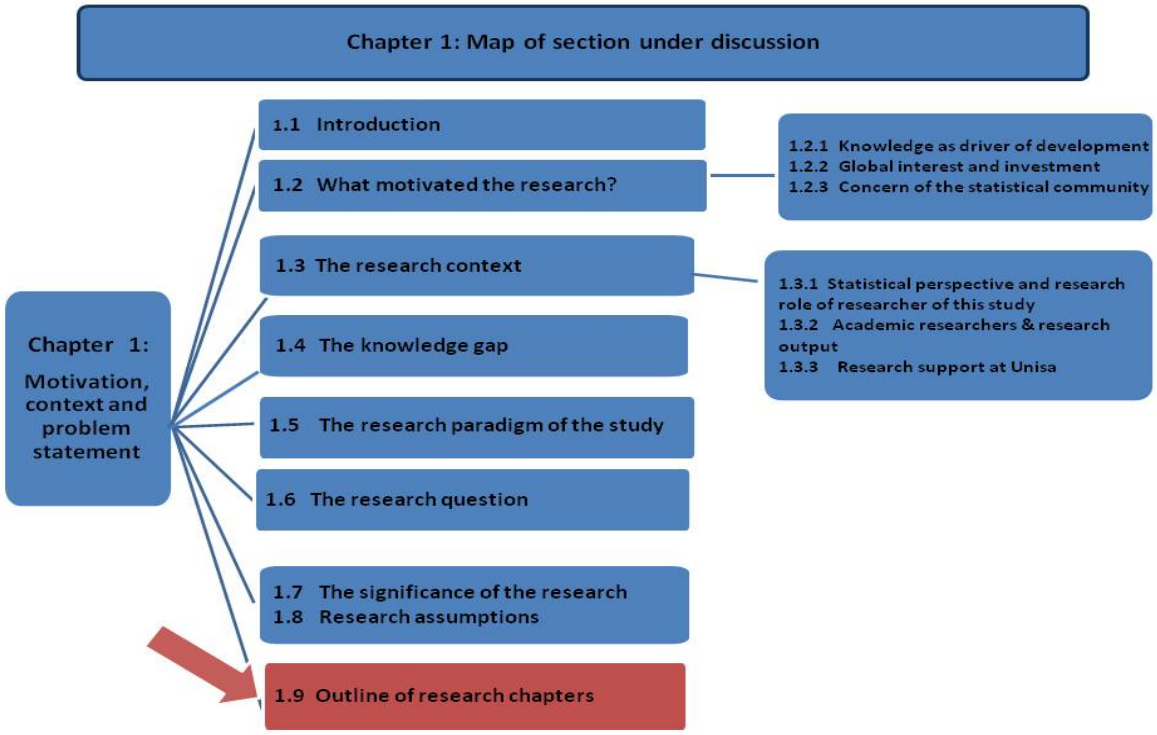
- A further assumption that links to GT as suitable research methodology, is the fact that GT is equally suited to the analysis of qualitative data and other data formats, e.g. survey data, quantitative data sources and case study data (Glaser 2002; Willig 2013:74). Because of the quantitative research environment in which the researcher of this study work, it was envisioned (thus assumed) that this study would – if deemed appropriate - revert to survey and/ or quantitative data collection and analysis techniques. Therefore extra attention was given to the feasibility of including such data in the methodology eventually selected to conduct research.
- The assumption is also made that research question formulation of this study aligns with GT principles that allow an initial broad research question statement to evolve into a more refined and specific research question/s as theory development progresses in GT analysis cycles.

Several important assumptions link to the context of the research that was detailed in Section 1.3. These assumptions include:

- The definition of *research output* in the context of this study as referring to academic articles published by academic researchers in the DHET accredited list of journals. *Research output* is in general perceived to include published research articles in scholarly journals; peer reviewed conference proceedings; scholarly books; and post-graduate throughput (completed Master's and doctoral degrees). However the scope of this study is limited to published articles.
- In the context of this study academic researchers, independent research support statisticians, HODs of academic departments and institutional managers are regarded as research participants
- The research participants of the study are mostly affiliated with a specific HEI, namely an open and distance learning institution. It was an assumption of this study that the working environment of this institution differs from that of residential HEIs because of its ODL status, its student composition that accompanies the flexibility of an ODL learning environment and student headcount (student: lecturer ratio) of the specific ODL institution.
- It was furthermore assumed that field notes on a set of 36 articles could serve as a potential data source in this research. The researcher of this study co-authored and provided statistical research support and input to all of these articles. To protect the privacy of research participants the subset of articles is not included in an appendix. (The permission of article authors was obtained if reference was made to field notes in the research that pertain to a specific article).
- An important contextual assumption of this study assumes that the range/ or variety of statistical support services rendered to academic researchers by support units varies between HEIs locally and internationally. Reference to statistical support services in this study pertains to UNISA as a South African ODL institution. The study furthermore assumes that UNISA, due to the institutions' focus on undergraduate students does not represent/compete with residential research intensive universities in South Africa.

This section consolidated critical research assumptions and will point to additional research assumptions as they appear in further discussions. Section 1.9 concludes the chapter by outlining research progression in the remaining five chapters of this thesis.

1.9 Outline of research chapters



The discussion of research in this thesis is outlined per chapter in this section.

Chapter 2 of this study covers the literature review. The chapter in fact provides two literature reviews, namely a literature review on the issue of the timing of reviewing literature in GT research and a second literature review on the *research output and research output productivity*, the topic of this thesis. The chapter motivates why a literature review is treated differently in grounded theory studies to conventional research studies. To explain the literature review argument the chapter firstly states the purpose of a literature review. This is done to evaluate if opinions on reviewed literature in GT studies negates the purpose of reviewed literature for conventional research (GT principles propose an 'open'/ clean slate mind). In responding to this issue, the chapter further investigates how literature is accommodated in GT so as to reap the benefits of an initial literature review in conventional research. The chapter argues that it is actually the *timing* of a literature review and *why* literature is reviewed in GT research that poses as a possible problem: GT does not negate the value of reviewing the literature. The chapter continues this reasoning by examining the ways independent GT researchers approach the initial (and follow-up) literature review/s in their studies, and, the literature review stance of these researchers. The stance that this research assumes with regard to reviewing literature is also reported. Chapter 2 concludes with a literature review - structured according to GT principles - of the field of *research output delivery* to verify the paucity of knowledge in this field in her role as support statistician towards delivery of published articles in accredited journals.

Chapter 3 describes the methodology of grounded theory and how it was practically implemented in this study with the purpose of informing the phenomenon of research output productivity. The chapter begins by highlighting the non-conventional and cyclic (rather than linear) research-execution and reporting style of the method and explains that the cyclic sampling-collection-analysis

execution method is attributed to the basic GT assumption that theory emerges from the data as and when that data is sampled and analysed, and that data is sampled (and choice of data source decided) as and when evolving theory so dictates. Departing from this basic principle, GT methodology is discussed by firstly defining GT method, briefly outlining the components of GT method (and pointing to the various versions of GTM) and defining the terminology of the method. This covers the concepts of *the substantive research area, sampling units, data incidents or events, data sources, research participants, theoretical sensitivity* and *theoretical saturation*. The discussion then turns to specific processes imbedded in the methodology that include *theoretical sampling, constant comparison, coding, coding families, memo-writing*[8] *and theoretical sorting.* Other methodological issues addressed in Chapter 3 link to the selection of an appropriate data source when research commences; whether theoretical sampling of research participants is applicable at the onset of research execution; how collected data is analysed; the development of theoretical sensitivity; and applicable measuring instruments. This chapter concludes by addressing the issues of the rigour of developed theory, limitations of the methodology and ethical considerations.

With the choice of classic GT motivated as research methodology for the study in the previous chapter, the commencement- and interim cyclic phases of GT analysis are reported in Chapter 4. The chapter starts off with a brief literature review of independent GT studies that utilised literature as commencement data source. This database discussion serves to illustrate that literature can be used as data source in the initial stage of analysis without violating the 'open mind' principle of GT. The discussion then indicates how practical aspects of GT execution are dealt with in research execution. Aspects discussed include (i) the type of data events in literature considered as data for the research (e.g. events linked to the research process and editorial process that concern *research production* and *output delivery*); (ii) coding: how labelling of events should be managed to facilitate development from open to more abstract/ conceptual code; (iii) data capturing: the layout and format of electronically captured code and links to literature references; and (iv) a programming strategy to cluster data events. The emerging concepts that these clusters represent serve as forerunners of GT categories. The discussion indicates that emerging concepts from the literature data source gradually require additional data – and a data source - to refine the emerging conceptualisations. This realisation introduced an interim data collection and analysis phase. The chapter motivates the suitability of responses to an open-ended questionnaire as additional data source and discusses the design, administration and cyclic GT analysis of individually returned questionnaires. The concluding section of the chapter indicates that higher levels of abstraction of conceptualisations materialised as a result of the additional data source and identifies abstract conceptualisations as preliminary GT categories. In the broader context of the study these categories represent provisional impacting factors on research output delivery.

A crucial finding derived from the analysis in Chapter 4 indicates that the substantive research area (in the interim cyclic analysis phase) is too broad to refine theory and to drill down into category-detail. To facilitate detailed theory development the substantive research area should be narrowed down. The question was how this should be achieved? The *environment category* of the emerging ROP theory presented as a possible means of delimiting the research field.

[8] Memo-writing is also referred to as memoing.

The next chapter, Chapter 5, builds on the theory developed in Chapter 5 by indicating how interim ROP theory – now delimited to *researcher environment* – is verified and refined using response data collected from a closed-ended questionnaire and field notes[9] of the researcher. To refine theory the chapter (i) firstly summarises interim theory development, (ii) identifies issues that arose during interim theory development that require further attention, (iii) motivates responses to a to-be-designed closed ended questionnaire as appropriate to answer to these issues, (iv) discusses the design of the questionnaire against the backdrop of listed issues, (v) discusses the GT analysis process (administration, collection and analysis of the data), (vi) explains the choice of appropriate analysis techniques used to desify GT categories and describe relational links between categories. The chapter concludes by indicating how insight gained from newly acquired knowledge shapes ROP theory development and continues to ask questions of the emerging theory. These issues are again addressed in cyclic analyses up to the point of saturation where the categories and relational links between categories identified are considered as refined theoretical components of this research.

Chapter 6 presents the final theoretical model of ROP as identified by this research and lists the limitations and grassroots recommendations on how academic articles can be published more efficiently: how a deeper understanding - on institutional, management, departmental, level - of the dynamics of the research process, production and publication, can lead to effective support and increased publication rate. By means of visual displays the final chapter traces the progression of ROP theory development affected by the GTM analyses of the various data sources to the graphical presentation of the model of the dynamics of ROP. The chapter indicates how, true to GTM, the research questions and title of the research evolve as theory development progresses.

[9] The field notes were compiled from statistical consultation interaction with academic researchers

Chapter 2

The timing of reviewing literature in GT research and the initial literature review of this study

2.1 Introduction

Chapter 1 introduced the research topic of the study, namely research output productivity, and the preliminary[10] research question that asks what factors and/ or events - associated with the research process, or, within the research process - impact on research output productivity. The introduction included a motivation for and contextualisation of the research. The chapter argues that, from the perspective of the research under investigation, there is a knowledge gap in *research output productivity. Thus,* a grounded theory research methodology is a justified methodology to use in the research setting of this study[11].

Grounded theory methodology is also the reason for the format of the literature review presented in this chapter. Unlike conventional research approaches that move directly to literature pertaining to the research topic, this chapter firstly reports, in an independent literature study, on the position and timing of reviewed literature in grounded theory research prior to embarking on a discussion of reviewed literature on research output productivity. The latter, research output productivity, is then presented in a format that complies with the assumptions of reviewed literature in grounded theory research.

Against the given of the invaluable role of reviewed literature to any research endeavour, the primary argument of this chapter concerning the *impact and timing of reviewed literature* in GT methodology is structured as follows: (i) the value and contribution of reviewed literature to any research endeavour are discussed in Section 2.2. Research argues that a clear understanding of the purpose of literature in a research study will ensure proper and effective use of the literature towards the eventual goal of quality research findings. Subsequently, to answer to the question of why literature in GT methodology is/ was a contentious issue, and why the current study follows a GT approach, (ii) the discussion sketches the background of what GT methodology entails in terms of process, principles, properties and assumptions[12]. This is described in Section 2.3.1. The subsection also discusses the background of the GT assumption of 'open-mindedness' or 'a clean slate' approach that led to literature in GT application being a much debated issue. The next subsection, (iii) Section 2.3.2, discusses the strengths, weaknesses and misconceptions of the GT methodology. This further motivates why GT methodology is an attractive option for this study. In Section 2.4 the GT literature review-issue is debated by presenting (iv) reviewed literature on the format,

[10] The theory development property of GT results in the research question continually being refined as more information becomes available. Please refer to Chapter 3, section 3.2.
[11] The GT methodology was indicated as part of the research paradigm of this study in section 1.5 of Chapter 1.
[12] A detail discussion of the process of grounded theory is presented in Chapter 3 as part of the research methodology of this research.

positioning, use, purpose and timing of (subject specific) literature in grounded theory research. The section relates how options on the placement and use of literature in GT application have evolved since the introduction of grounded theory in 1967. The literature reviewed in this section indicates how various researchers have approached the presentation of literature in their GT work. The examples listed also illustrate the conditions that affect the placement of the literature review/s in a grounded theory doctoral thesis.

The next section, Section 2.5, discusses (v) options available to grounded theorists regarding the timing, placement and integration of reviewed literature when conducting research. The section concludes by stating the researcher of this study's stance on the literature and detailing how reviewed literature in this study will be used.

Once the stance of the current research on literature use has been explained, the penultimate section of Chapter 2, Section 2.6, presents findings on reviewed literature (reviewed according to GT literature review principles) regarding concepts such as *research output proficiency/research output/ research output delivery/ research output productivity/ a statistical perspective of research output proficiency* and similar terms to verify a knowledge gap and refine the research question of the study. The section will indicate that the purpose of reviewing literature in this section is not to study existing theory on ROP (which could influence further theory development in this research) but rather to verify the afore-mentioned knowledge gap on ROP.

The last section of Chapter 2, section 2.7 evaluates whether literature reviewed at this stage of the study agrees with the general intent and purpose of a literature review (section 2.2) in research, and whether this kind of review contributes towards research rigour.

2.2 The purpose of reviewing literature in research

Reading on a topic of interest comes as a natural activity for researchers when contemplating an investigation. This is done with good reason: quality/accredited literature serves as a reliable background source of what is known and what has been done in a specific research field. Reviewing literature informs and enriches any researcher and familiarises a researcher with subject specific researchable topics.

The foregoing illustrates some of the many advantages and reasons for reviewing literature in a research endeavour. Literature serves to motivate a research undertaking; enriches and develops the scientific mind set, reasoning and investigative skills of a researcher; keeps the researcher informed on his/her substantive research area; and ensures that sensible, worthwhile research is undertaken. The literature abounds with arguments motivating the critical and beneficial role and purpose of reviewed literature. Researcher such as McGhee et al., 2007; Coyne & Cowley, 2006; Chiovitti & Piran, 2003; Creswell, 1998; McCann & Clark, 2003; Urquhart, 2007; Denzin, 2002; McMenamin, 2006; McCann & Clark 2003; Strauss & Corbin, 1998; Henwood & Pidgeon, 2006:350; Walshaw 2013; Briggs, Coleman & Morrison 2012, all attest to this statement.

As mentioned in the introduction to Chapter 2, reviewing literature in GT research has been much debated. By including this discussion on the value of reviewing literature in any research endeavour,

the discussion aims to indicate (along with further explication and motivation in this chapter) that these benefits and purposes are also valued in GT research albeit timed and used in a slightly adjusted format to conventional research studies. Subsections 2.2.1 to 2.2.4 touch on some of the contributions that reviewing of the literature makes to research.

2.2.1 Contextualisation: literature situates a study in the substantive research field.

Apart from situating planned research in the specific research environment of a study (refer to section 1.3, Chapter 1), the positioning of a research undertaking in the bigger picture of research in a specific field is beneficial. It serves to motivate the contribution that the planned study can make to the specific research field. Hofstee (2006:91) remarks that the knowledge contribution of the planned research can be illustrated by reporting on what is currently known in the research field and what knowledge the planned or envisioned study can add to the existing body of knowledge. The planned research can indicate – from the literature – what the extent of existing knowledge is in terms of existing or developed theory; methodologies used in previous research endeavours; philosophical perspectives associated with previous studies; and theories used to support previous research. These attributes can be set against planned outcome, methodology, and philosophical and theoretical underpinnings to demonstrate unique approaches and envisioned knowledge contribution.

Literatures thus serves the contextualising purpose of indicating which methodological approaches have been used in similar studies and what their shortcomings are; where knowledge gaps in the research field exist; and where the current study fits in (Hofstee 2006:91-93, 101) with respect to philosophy, methodology and theoretical underpinning, and theory development.

The role of the literature to situate this study cannot be ignored (already mentioned and still to come). This applies specifically to aspects such as the identification of a knowledge gap (compare Section 1.4, Chapter 1 and Sections 2.6 of this chapter) and philosophical underpinnings of this research. Reviewing independent GT studies brings insight to this research (please refer to section 1.5 in Chapter 1). It should be noted that GT research does not – in contrast to other conventional research methodologies, study existing theory on the phenomenon of interest in the initial cycles of GT application as this may jeopardise the GT assumption that theory should be allowed to emerge from the data and not be influenced by preconceived perceptions (existing theory)[13].

2.2.2 The literature review serves to motivate a particular research undertaking

Walshaw indicates that literature can be used to specify and define the argument and focus of a study and comments that the role of the literature to justify and build a case for a specific study cannot be underestimated (2012:39). This viewpoint is particularly applicable to the research under discussion. The motivation of the research topic of this study, namely, *research output productivity* and/or *article publication, i*s linked to the quest-for-new-knowledge debate in literature. The literature therefore plays a crucial role in motivating the research topic of the research under discussion (Chapter 1, Section 1.2).

[13] These assumptions and principles are discussed in Section 2.3.1

Hofstee (2006:93) underlines the role of literature as a motivational agent for a particular research undertaking by indicating that a study can argue and substantiate the appropriateness of a new approach from the literature. Furthermore the ability to motivate a knowledge gap (identified by means of reviewing literature) serves as strong motivator in justifying the research. The ability of a study to verify from literature and then address the specific knowledge gap further serves to substantiate that the particular research undertaken is original, ethical and legitimate (Hofstee 2006:102). This property adds value to any proposed research and is also applicable to the research under discussion.

Hofstee also refers to the role of literature in identifying theory or theories that support particular research studies (2006:93). However as previously indicated and further discussed in Section 2.3.1 (and in Chapter 3) in GT application an in-depth review of the literature to study the theory or theory development in other independent research is not the focus of the initial cycles of GT research. Existing theory from the literature *is* used in GT research but more towards the advanced stages of GT theory development – the purpose then being to compare a developing theory of a new study to existing theory. This distinction between initial and advanced cycles of GT analysis serves as a further illustration of the different ways in which literature is applied in GT research. This show how the 'open minded' approach of GT methodology is accommodated. The principle assumes that insight and theory development in GT application should be allowed to emerge from the data and not be influenced by preconceptions such as theory associated with independent research.

2.2.3 Reviewing literature enriches both researcher and research

Walshaw (2012), and Charmaz (2012) both comment on the role of the literature in enriching the researcher as well as refining and enriching research. By reviewing literature intelligence is gathered which informs and familiarises the researcher on his/her research field. More in-depth knowledge enables researchers to argue their case with a confidence that is based on a broad knowledge base.

Research itself benefits from in-depth knowledge in the sense that research questions and objectives can be formulated more specifically and unambiguously; reasoning in the research can be substantiated from the literature; literature serves to enlighten arguments of the study and lends authenticity to stated claims. The last mentioned also applies to GT application when developed or emerging theory is substantiated against existing literature in the more advanced cycles of GT analysis and theory development (Charmanz 2012:168).

Walshaw (2012:139) also mentions the valuable role that the initial literature review can play when that initial review is revisited on completion of a study to indicate the unique contribution of new knowledge to the existing body of knowledge that the specific research was able to add. Reviewing literature serves the same purpose in GT application albeit in a different format and timing.

2.2.4 A literature review illustrates researcher capability and research skills

According to Hofstee (2006) and Walshaw (2012:139) how researchers present reviewed literature reflects their research capabilities. For example, the inclusion of classical/or seminal research works and key researchers in a literature review reflect the researchers' familiarity with, and knowledgeability in, their research field. Furthermore the ability to identify critical knowledge gaps

in a research field and the way reviewed literature is interpreted and presented in a literature review illustrates research competency.

Whisker (2008:173) as well as Bryant and Charmaz (2007:123) comment on the ability of researchers to engage with the works of other researchers: the ability to argue, integrate, develop, expand and even contradict the arguments of other researchers. They equate this ability with research skills and Charmaz comments in this respect that:

> …[it is] important to situate your work within the body of related literature, both because it is academically honest and to give credit to other researchers… how you were able to build on and see further.

This way of engaging with existing literature can also be referred to as critical thought.

The above argument is also applicable in reverse order: by reviewing literature, researchers' ability to do research is developed. Their critical thought processes, knowledgeability, familiarity with the research field and ability to identify key researchers in the research field develop by reviewing literature. In the same manner their ability to engage with the works of other researchers is advanced. In all, engaging in reviewing literature develops research/er skills.

This section explicated the critical role of reviewing literature in any research endeavour and it applies equally to GT research. GT application does not negate the invaluable contribution of literature to research. Section 2.3 which follows will provide a brief definition of what the method of grounded theory entails with the purpose of explaining the 'open mind' or 'clean slate' principle of GT that causes the format of a GT literature review to deviate from literature reviews in more conventional-research thesis discussions[14].

2.3 GT as preferred methodology: essence of GT; strength and weaknesses

The previous section suggested that literature, and in particular the reviewing of literature in GT research is managed somewhat differently from conventional research endeavours. The question might well be asked why GT methodology perceives the literature differently from other research methodologies and why GT presents as an attractive and viable methodological option for the current research as contextualised in section 1.3, Chapter 1.

The choice of GT methodology is best addressed by firstly discussing the essential elements of GT method in terms of principles, properties and assumptions and then by looking at the strengths and weaknesses that makes the study an attractive option for this research. As part of this discussion the background is also sketched of the open mind assumption of GT that causes the reviewing of literature to be treated somewhat differently to that assumed in other research methodologies.

2.3.1 Essence of GT

The essence of GT methodology and method is outlined by means of a (i) few classic definitions, (ii) a summary of the process of applying GT method and (iii) a broader description of the properties and

[14] Section 2.4 of this chapter devotes an entire section to the *literature review debate* that at a stage took centre stage in the GT community

assumptions that underlie grounded theory methodology. The discussion provides an overview of what GT method implies and complements an understanding of the literature review debate in section 2.4.

2.3.1.1 Classic definitions and the technique of doing GT

The original designers of GTM, Glaser and Strauss (1967), offer what has become a classical definition of GT, namely:

> A Grounded theory is one that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed and provisionally verified through systematic data collection and analysis of data pertaining to that study.

The definition implies that theory is discovered through the data.

Strauss and Corbin (1990:23) elaborate on this definition by adding that GT method defines:

> … a continual interplay between data collection and analysis to produce a theory [of a researcher phenomenon]. A grounded theory is derived inductively through the systematic [and concurrent] collection and analysis of data pertaining to the phenomenon.

Bowen (2006:13) explains the GT method as a reciprocal action indicating that GT research does not start off with an existing theory that is verified by the research process, but rather as a technique that departs from an identified substantive area[15] in which concepts of relevance to the research area are develop from collected data that are, in turn, integrated into a relational structure that constitutes developing theory.

The GT method/ technique

The generic process of implementing GT is comprehensively discussed in the literature. For example Glaser (1998); Urquhart et al. (2010); Van Niekerk and Roode (2009); Fernandez (2004); Hoda et al. (2011) provide clear descriptions of how implementing GT proceeds. The technique can be described as a number of concurrently overlapping processes that proceed in a cyclic rather than linear fashion: research starts off with tentative or seed concepts (even referred to as 'hunches') about a process or phenomenon. This steers the researcher towards an area of enquiry (a *substantive area*) and a broadly or loosely defined research topic, the initial starting point of the research. Continued cycles of data collection and analysis lead to insight, refinement of the research question and emerging theory that explains the researched phenomenon.

How do the indicated cycles of collection and analysis proceed? Once research is formulated in terms of a broadly defined research topic, data is sampled from an option of primary and secondary data sources that are available and relevant to the substantive area. Meaningful and relevant events in sampled data are identified and coded. Initial coding (often referred to as *open coding*) is simple and describes particular incidents or events in the data. While coding is underway further collection of relevant data continues. As part of the analysis code from previous analysis steps are *constantly compared* to more recent code to identify underlying similarities, patterns or suggestions of concepts and abstractions. Continual coding and comparison gradually introduce a higher level of coding (referred to as *substantive code or conceptual code*) that represents emerging concepts,

[15] A *substantive area* in GT research refers to a field of interest in the subject specific research area of a researcher.

conceptualisations and relationships. Such code labels conceptual abstractions and no longer refers to simple incidents in the data[16]. In other words code gradually becomes more abstract and conceptualised. Concepts in turn (may) gradually cluster together and suggest overarching concepts that represent the underlying structure of evolving theory. Codes that serve this purpose are labelled *categories* (for example concepts of *enthusiasm, apathy, interest, resentment*, *passion* may, in a specific study suggest an overarching concept of *attitude* as a category of emerging theory on, say, the use of cellular phone apps). Data collection and analysis also serve to inform identified categories in more detail, referred to as *densification*. Cycles continue to densify categories and their properties up to a point where categories are clearly specified and understood (referred to as *saturated categories*). Towards the more advanced cycles of analysis – when categories become saturated - relational links between and within categories start to emerge. Code that describes relationships between and within categories is referred to as *theoretical code*. Relations also indicate a pertinent or central category (or more) that relates to all or most other categories – the *core category* of the research. The core category indicates the central theme or focus of the research. A clear understanding of the *core category* thus informs and refines the research topic of the investigation. The relationships and relational links are formulated as propositions (or hypotheses) that explain specifics of relationships and how these relations integrate into an explanation of the dynamics (or main concern) of the researched topic (Fernandez 2004:86). If the definition of theory (refer Tavalaei and Abu Tabil 2010 mentioned in Section 1.5.1, Chapter 1) is kept in mind, the *core category*, additional *categories* and the relational links (*theoretical code*) thus constitute developed grounded theory. (The data collection, analysis and comparison cycle conclude when categories and relational links are saturated).

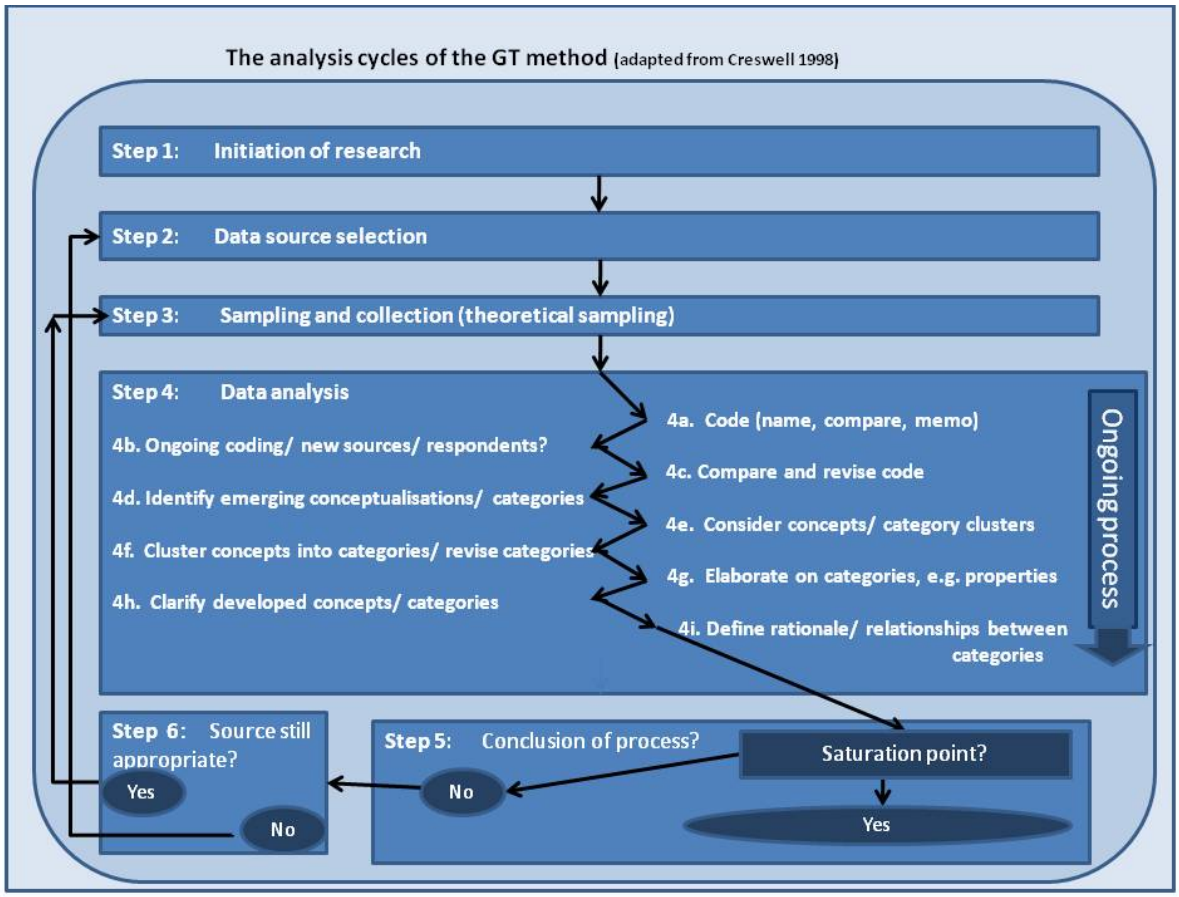
The above paragraph explains theory development in terms of progressively higher order code that recognises increased levels of abstraction of data events. The conceptualisation process is facilitated in the way sampling is conducted and data obtained: in the commencement phase of sampling when little is known about the substantive area and the research topic is formulated in general terms, data is initially purposively sampled. Data is collected from a data source/s that appears most relevant at the time. As coding and comparison of code in successive sampling cycles[17] progress sampling is guided by the knowledge deduced in prior analysis steps along with the need for additional information to continue improving and informing recently identified and coded conceptualisation, categories and relationships. In other words, sampling becomes more selective to address specific issues that require clarification. This form of sampling, based on the need for specific information to advance theory development, is labelled *theoretical sampling*. *Theoretical sampling* forms a distinctive attribute of the GT method (in a study, preliminary results might for example suggest that an *attitude* category underlies theory development on cellular phone apps-usage. To further inform the potential category, subsequent sampling can, for example, be guided by sampling a group known to represent cellular phone apps users such as technology students). Theoretical sampling continues to become increasingly time-economic as information needs become more specific.

[16] In any analysis cycle code can include *open code* and higher order or *substantive code*: some data events may inform concepts that have been identified in earlier cycles, while other events point to entirely different concepts not suggested in earlier collection and analysis cycles.

[17] In GT terminology, the process of coding and comparison of data events is often collectively referred to as *analysis.*

Memoing is an additional component that facilitates theory development throughout the GT process and involves the capturing of ideas, conceptualisations, observations and insightful thoughts that emerge during analysis cycles. The process is akin to taking field notes. By referring back to memos and comparing memos to theory that at a specific stage emerges from data, conceptualisations, relationships and category development can be refined and verified. Sources that describe the GT method for example include, Fernandez 2004:85; Glaser 1978; Van Niekerk and Roode 2009:100; Kennedy and Lindgard 2006:103; Glaser and Strauss 1967; Strauss and Corbin 1990; Creswell 1998.

Figure 2.1: The steps in the analysis cycles of the GT method (adapted from Creswell 1998)



In summary critical elements, processes and principles implied in GT method include:

- Commencement phase: Data analysis commences by *purposively sampling* data from a source that seems relevant at the time because of limited knowledge of the substantive area at this stage
- Throughout research data may be sampled from more than one data source that at any stage appears relevant. Sources may be either quantitative or qualitative
- Subsequent cycles of the GT method consist of *theoretically sampling* and collecting data; *coding* meaningful relevant events in collected data; and *constant comparisons* of code, conceptualisations, *categories* and relationships
- The levels of abstraction of conceptualisation advance as analysis and collection continue. This is captured by means of a coding convention

- Concepts/conceptualisations evolve into *categories, dimension and attributes* of categories, *a core category,* and *relationships* between conceptualisations
- The specifics of relationships and the dynamics of the theoretical structure that underlies a phenomenon are specified as propositions (*theoretical code)*
- Concepts, conceptualisation, categories, category-attributes and relationships are of interest to the process and not initial data events (open code)
- Categories, their properties and relationships are clarified by sampling specifically (theoretical sampling) to explain uncertainties/ unknown elements (densified and saturated)
- *Memo-ing*[18] facilitates development and verification of emerging conceptualisations and is implemented throughout analysis cycles
- In advanced cycles of theory development the accuracy of conceptualisations or categories enrich and/ or strengthen evolving theory (Glaser 1998:69) because literature presents as a form of data
- *Theoretical sensitivity*[19] furthermore assists the process of conceptualisation and formulation of elements of evolving theory.

2.3.1.2 Properties and assumptions of the grounded theory methodology

The literature reports extensively on general features, attributes and assumptions of grounded theory. The discussion of GT in Chapter 3 attests to this. Researchers include: Glaser and Strauss (1967); Glaser (1998); Creswell (1998); Egan (2002:280); Charmaz (2012); Gerrish and Lacey (2006); Bryant and Charmaz (2007); Strauss and Corbin (1998; 1990); Kennedy and Lingard (2006); Borgatti 2008). As part of the introduction to GT methodology and to underscore the different approach that this chapter takes to reviewing literature, distinctive attributes and assumptions of GT methodology are bulleted below.

Properties and assumptions

- GT method is a cyclic concurrent process of data sampling, coding and comparison
- Since inception of the GT methodology in 1967 different approaches/or versions of GT method have evolved. This is owing to considerations such as the timing of reviewing literature in GT studies; GT coding conventions (please refer to Chapter 3); and different philosophical approaches (for example, constructivism/symbolic interactionism (Gerrish and Lacey 2006:195; Charmaz 2012) to name but one approach)
- Grounded theory method is part of a theory developing methodology and not a theory verification methodology
- Because of theory development capabilities the methodology is ideally suited to substantive areas with a paucity of knowledge (Gerrish and Lacey 2006: 193)
- Grounded theory assumes only a basic general understanding of the substantive field when research commences
- Theory develops (or 'evolves') from the data – therefore theory is grounded in data, which explains the 'grounded theory' terminology

[18] Memoing: jotting down suggested relationships, conceptualisations to follow up in further analyses.
[19] Theoretical sensitivity implies sensitivity to recognize concepts of evolving theory. Sensitivity is developed – according to Glaser (1998:68) – by reading extensively (including theory of literature reviewed) in fields related to the substantive area but not in the substantive area (on theory related matters).

- Because theory development originates from the data, the possible impact of preconceived theoretical notions, prior knowledge and experience can suppress or confound pure theory emergence from the data (Egan 2002L278) – if researchers are not aware of this consequence and care should be taken to pre-empt such bias.
- The previous statement links directly to the idea of a clean-slate[20] / or open-minded approach which is central to GT method. This prerequisite is the root of the debate on the timing of reviewed literature in GT research (refer to Section 2.2.2)
- Closely related to reviewing literature is the development of theoretical sensitivity: the dilemma of reading literature to develop theoretical sensitivity and the possible impact of preconceptions (from literature) on developing theory (Kennedy and Lingard 2006:102; Strauss and Corbin 1998:43
- GT method regards all data sources relevant to a substantive area as data because of the *all-is-data* principle of grounded theory (Glaser 1998:8)
- The *all-is-data* principle applies equally to literature and literature reviews
- Qualitative and quantitative data are therefore regarded as suitable data
- Unique to GT method is the cyclic nature of concurrent data collection, analysis and comparison of coded events, conceptualisations, categories and properties and relationships
- Data analysis is systematic and commences as soon as data becomes available
- A distinction can be drawn between substantive[21] theory and formal theory

The background on GT properties and assumptions listed above, in addition to the more comprehensive discussion of the property of open-mindedness which follows in the next subsection, complements the discussion of the literature review debate to follow in Section 2.4.

2.3.1.3 The open-minded GT assumption that impacts on reviewing literature

Given the fact that the contribution of reviewing literature in research is recognised throughout the research community – which includes the GT community - the question arises why reviewed literature should be treated differently (or carefully) in GT research; what causes the sensitivity around reviewing literature and how should it be managed in GT research?

The issue of how reviewing literature should be managed is addressed in Section 2.4. The sensitivity regarding literature stems from the previously open-minded principle of GT that allows theory, and thus relationships and conceptualisations, to develop from an unbiased/open mind to what the data conveys (Ke and Wenglensky 2010). Therefore, a key requirement of effective grounded theory application is an open-minded approach (Tan 2010:97; Glaser and Strauss 1967:8-9). Grounded theorists/ researchers also refer to this researcher-attribute as a "clean slate" or *tabula rasa* (Glaser 1978; Clark 2005) mind/ mindset. They argue that researchers who adhere to discipline-specific notions and ideas (preconceptions) cannot apply and develop the attribute of theoretical sensitivity during grounded theory analysis (Tan 2010:97). Glaser (1998) states that preconception *forces* theory and does not allow theory to emerge from the data.

[20] The clean slate approach implies that that the researcher should free his mind from preconceived theoretical ideas and be open to new theory conceptualizations.

[21] Substantive theory refers to theory developed in a substantive field, Formal theory have been developed and generalised in more than one substantive field.

The open minded requirement has been misunderstood and has given rise to misconceptions about the use and timing of literature; prior theoretical conceptualisation; prior knowledge; prior experience; theoretical sensitivity and eventually, effective research application. The crux of the misconception in this regard seems to revolve around how *open-mindedness* should be understood and how literature (and prior knowledge and experience) should be 'used' in grounded theory research. In this regard Seidel and Kelle state that: "An open mind does not constitute an empty head" (1995:56; Dey 1999) – existing knowledge is a given. Along the same lines it is argued that literature knowledge is essential in research to identify and motivate gaps in research knowledge (Holloway and Todres 2006:202); establish what is known in a field (Bowen 2005:210); be able to converse with experts in the research field, develop theoretical sensitivity (Holloway and Todres 2006:203); grow intellectually (Bowen 2005:211; Holloway and Todres 2006:203); be able to plan a specific research study (Jones and Alony 2011:101); adhere to doctoral study format requirements (Bowen 2005:208; Fendt and Sachs 2008; Stern 2007:123); and appease research committees (Bowen 2005:214). Barbour refers to "bumper sticker of approval' (2001: 323) and Strauss and Corbin indicate that literature also serves as secondary data source (1998).

Researchers have argued open-minded and pre-conception issues from various perspectives and identify specific concerns: traditional theorists link their *open-mind* perception directly to the use of literature (and as such an initial literature review) and the comment by Glaser that "there is a need not to review the literature in the substantive area of the research" (Glaser 1992:31). This statement has to be understood in context. Glaser made this requirement in anticipation of presuppositions and pre-conceptions stifling and inhibiting the pure message of the data and forcing the data. Supporting a position of no initial literature review in the substantive research area in the initial stage of data collection and analysis, until such time that that categories and concepts start to emerge from the data (Glaser and Strauss 1967:37) is an attempt to ensure unbiased theory development. If applied rigorously this approach might encourage creativity but at the same time lead to naïve induction and interpretation (Bryant 2002; Goulding 2001), unnecessary work and repetitive research (Fendt and Sachs 2008:444).

Other researchers, for example, Strauss and Corbin (1998:45) advocate the use of literature from the onset of research but at the same time indicate how literature should be used (Fendt and Sachs 2008:439). Researchers argue that apart from the benefits of improving theoretical sensitivity and contextualising research (Strauss and Corbin 1998; Mills, Bonner and Francis 2006:29) literature serves as another voice (secondary data source) in data analysis, interpretation and conceptualisation. Literature as secondary data source is affirmed by many scholars (Holton 2009; Tan 2010:101; Fernandez et al. 2007:232.). If born in mind that grounded theory has gradually moved away from the orthodox method developed almost 50 years ago towards a more flexible subject-specific methodology in recent years (Kearney 2007:127, 140, 143; Bryant and Charmaz 2007a:15, 32; Tan 2010:95, 107; Fendt and Sachs 2008:441,448) *open-mindedness* should be interpreted as a mindset which asks *how*, *when and to what purpose* literature is used; *open-mindedness* should equate to an acute awareness of the risk of preconceived conceptualisation; it should invoke measures to guard against preconceived notions (constant comparison and reflection); it should acknowledge that researchers bring prior knowledge and experience to the research table which can influence data interpretation. Prior knowledge and experience are a given and cannot be ignored (Heath and Cowley 2004; Bryant 2002; Charmaz 2008; Fendt and Sachs 2008:

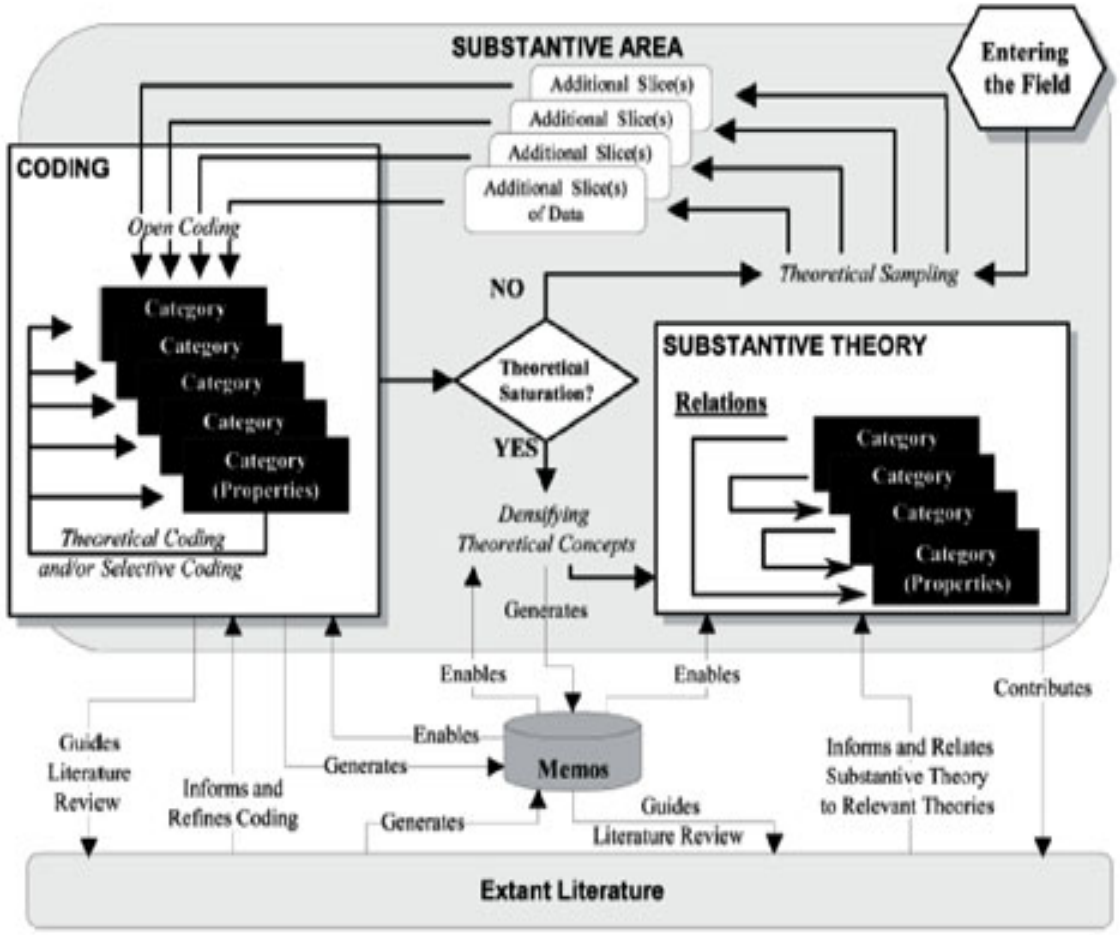
439; Selden 2005: 123). Charmaz (2006) comments that researchers often research a field and only decide on a methodology (for example GTM) once considerable research and review of literature have been undertaken. Knowledge gained in this process cannot be ignored. Ke and Wenglensky (2012), for example, remark that is not possible to start a research study without some pre-existing knowledge and experience. As Charmaz states, "no researcher is neutral" (2006: 46-47). Charmaz (2008) strongly advises that researchers state their position on literature knowledge, prior experience and even research philosophy to sensitise the researcher to the knowledge that he/ or she bring to the research and which can possibly affect judgement to allow theory to develop from the data (and not from preconceived ideas).

Fernandez (2004) supports the interpretation of an open mind as being aware of *how, for what purpose and when* literature is reviewed at any particular phase of the GT process so as not to bias theory development. He diagrammatically explains the different roles of literature at different phases of GT application (Figure 2.2 refers). The figure indicates that the purpose of literature in the commencement and earlier cycles of data collection and analysis is to learn more about specific conceptualisations that evolving theory suggests. Literature at this stage serves to complement and support conceptualisations. It clarifies and supports suggestions from the sampled data – it does not guide what concepts are developed. As theory development advances, literature can also compliment memos on suggested theory development: ideas jotted down as memos suggested by data[22] can be informed by the literature. When categories and theoretical codes become saturated and refined, in other words, when theory development has progressed to an advanced stage, the literature assumes a verification role for developed theory. In this sense verification implies consulting the literature to establish whether developed theory presents as a plausible explanation of a research phenomenon.

The purpose of this section was to familiarise the reader with the basic principles of grounded theory methodology to support the literature review debate in GT application in section 2.4. The open-mind perception and literature review issue influence the format of the literature review presented in this study. In the next subsection, Section 2.3.3, attention reverts to the justification of GT methodology as the methodology of choice for this study by balancing the strengths and weaknesses of GT in the context of this study. This comparison strengthens the earlier argument that GT is suited for the context of the present study because of the theory generating capacity of the methodology in circumstances where a paucity of knowledge is experienced.

[22] This is sometimes referred to as ideations (Charmaz 2012).

Figure 2.2: A diagrammatic explanation of the use of literature in grounded theory
(To be discussed in more detail in Chapter 3 (Fernandez, 2004)).



2.3.2 The strengths and weaknesses of grounded theory methodology

2.3.2.1 Strengths

A widely used methodology

Since the introduction of grounded theory by Glaser and Strauss (1967) some 40 odd years ago, grounded theory has developed into a popular and frequently used qualitative (and even quantitative) research method (Barker, Jones, Britton and Messer 1997). Titscher, Meyer, Wodak and Vetter (2000), for example, indicate that, as early as the 1990's, 67% of published qualitative research articles/papers included GT methods developed by Glaser and Strauss (Bryant and Charmaz 2007b: 32; Holloway and Todres in Gerrish and Lacey 2006:193). To date this trend is still escalating (Goulding 2005).

A methodology that develops theory from data in areas where limited research has been conducted

Effective (Ke and Wenglensky 2010) theory development from data, the distinguishing property of grounded theory method (Jones and Alony 2011:96; Bryant and Charmaz 2007a: 25; Barker et al. 1997), is also the greatest asset of the method and provides the researcher with a means of developing a theoretical understanding and explanation of a researched topic. At the same time empirical observation, as part of the analysis process, provides a backing of the developed theory or theoretical explanation (Jones and Aloney 2011:96). The detailed, rigorous and systematic method of analysis includes the development of abstract concepts and specification of relations between

these concepts – which forms the substantive theory. As Holloway and Todres comment in Gerrish and Lacey (2006:193) the strength of grounded theory method lies in the fact that the method goes beyond mere description of a researched topic to the development of theory, where the theory explains the researched phenomenon.

A suitable method for new research fields

Apart from the fact that the grounded theory method offers a transparent means of conducting and reporting theory advancement throughout the research process (Bryant and Charmaz 2007b: 33), the inductive reasoning principles of GT (Barker et al. 1997; Ke and Wenglensky 2010; Gerrish and Lacey 2006) continues to attract research in fields where little research has been conducted and little is known of a substantive research area. The method is suited to new research areas because the approach makes the requirement of existing grand theory unnecessary – theory development is the objective not theory validation (Bryant and Charmaz 2007b:46; Hunter, Murphey, Grealish, Casey and Keady 2011:6). Fendt and Sachs observe that grounded theory proves to be an essential tool for the development of new insights into social phenomena (2008:431). Jones and Alony (2011:96) support this by stating that grounded theory provides "rigorous insight in areas that are relatively unknown". Grounded theory adds value to a research field – by means of new emerging theory – when literature cannot (at that stage) provide a theoretical explanation for a phenomenon (Ellis and Levy 2009).

Grounded theory finds application in diverse research fields

The research fields in which grounded theory has been applied and where it is currently applied keep increasing (Bryant and Charmaz 2007b: 47). For example, research fields range from nursing (Gerrish and Lacey 2006; Hunter et al. 2011; Eaves 2001; Mills, Bonner and Francis 2006); to health studies (Kennedy and Lingard 2006; Sbaraini, Carter, Evans and Blinkhorn 2011); to library and information science (Selden 2005; Tan 2010; Fernandez and Lehmann 2005 – information systems); management (Fendt and Sachs 2008); information technology; business and business configuration (Douglas 2003; Allan 2003; Pandit 1996); poverty reduction (Bowen 2005; Bowden 2006); human resources (Storberg-Walker 2007; Bioia and Thomas 1996); organisational research; (Jonsen and Jehn 2009; Sutton and Rafaeli 1988) the film industry (Jones and Alony 2011); information management (Fernandez et al 2007); sociology, partner violence, care homes (Catallo, Jack, Ciliska, MacMillan 2013; Jeanty and Hibel 2011); education (Christ 2007; Harry, Sturges and Klinger 2005; Lemmer 2011); marketing (Perry 1998); leadership (Parry 1998; Kan and Parry 2004; Kempster and Parry 2010); information technology (Hoda et al 2011); e-reverse auctioning (Losch 2006); cultural diversity (Ely and Thomas 2001); e-governance (Heeks and Bailur 2006).

GT is applicable in many research fields. Bryant and Charmaz (2007b:47) remark that grounded theory finds application in 'any' field of research that includes contact with human respondents. Jones and Alony agree (2011:97). The references included serve to illustrate the broad application field of GTM. This serves inter alia to justify the application of GT method in a field such as *effectively publishing research findings*.

Systematic methodological research procedure

One of the virtues of grounded theory method is that it provides a single, clearly defined, systematic methodological approach to qualitative (and even quantitative) research inquiry. Guideline principles were set out by the original GT designers and subsequently modified and adjusted by successive schools of thought of GT researchers (Bryant and Charmaz 2007b:33). For qualitative researchers the single-systematic methodology (Barker et al. 1998) is very attractive compared to qualitative approaches such as case study-, participant observation-, ethno-methodological-, and clinical research analysis. These methodologies usually require more than one analysis approach (Denzin and Lincoln (1994 in Barker et al. 1998). Shah and Corley (2007:1825) discuss the same issue. The orderly analysis structure stems from the desire of Glaser and Strauss to set qualitative analysis methods on par with the formal deductive analysis strategies of quantitative research (Bryant and Charmaz 2007b:53).

Extensive use has refined grounded theory methodology

An added advantage of the grounded theory method lies in the fact that, over the past almost five decades (1967-2013), grounded theory has been extensively applied in many diverse research fields by researchers with different experiences and different research aims and objectives. The experience gained in this way aids methodological improvement, adjustment and refinement of the methodology (Bryant and Charmaz 2007b:47). These developments have positioned grounded theory as a robust and reliable research method. Guidelines have, for example, been developed to evaluate the quality of research and the research process (Corbin and Strauss 1990:16-21). The experiences of previous researchers who document pitfalls forewarn more recent researchers to avoid similar situations. In addition, early researchers described methodological adjustments to accommodate GT application in their specific research fields which again benefit more recent researchers who work in less familiar researcher substantive areas (Bryant and Charmaz 2007b:48; Glaser 2001:6; Jones and Alony 2011:99).

Grounded theory's suitability in investigating complex research phenomena

Grounded theory method is very suited to situations where the research topic and environment is complex with many interrelated and confounded themes and issues (Charmaz 2003; Bryant 2002; Fernandez and Lehmann 2005). Grounded theory analysis – with the ability to "code and fracture" events (Fendt and Sachs 2008:439) into primary elements – provides an effective means to untangle these interrelated issues – which emerge as concepts. These can in turn be re-assembled into an interpretable and integrated whole (Charmaz 2008). The process of conceptualisation and identified relationships eventually develops into substantive theory (Fernandez et al. (, Martin, Gregor, Stern, and Vitale 2005).

The quality and rigour of grounded theory research

The systematic approach of grounded theory method ensures quality in research in that the key processes of *constant comparison* and *theoretical sampling* continually monitor emerging conceptualisations and relationships to ensure their validity (not based on single speculated notions, but verified in repeated cycles of sampling and analysis) and to ensure that explanations (*theoretical code*) are viable (Fendt and Sachs 2008:431). The properties of rigour and quality are of the essence considering the fact that grounded theory method develops subjective experiences/or events (measurement of social behaviour) into concepts and theoretical statements that explain how people derive meaning from inter-subjective events and experiences.

Grounded theory accommodates quantitative-type data sources

Grounded theory is most often cited in qualitative research applications and therefore (erroneously) labelled as a qualitative research method (Barker et al 1998). The qualitative label also has an historical link which goes back to the 1960's when grounded theory methodology developed as an alternative to formal, rigorous, statistically backed quantitative analysis methodologies (Bryant and Charmaz 2007b:33). However grounded theory method is equally suited to quantitative and mixed methods research designs. The original developers stated this in their work (Glaser and Strauss 1967) and numerous studies attest to this fact (Knigge and Cope 2005; Pandit 1996; Losch 2006; Fernandez et al 2005; Johnson 2008; Barker et al. 2008).

Various attributes of grounded theory make it an attractive research method

Several other aspects of grounded theory make the methodology an attractive option for researchers (Bryant and Charmaz 2007:49; Barker et al. 2002; Glaser and Strauss 1967). Attributes mentioned include:

- Justification: the systematic methodology and guidelines of grounded theory act as justification that the proposed research will be based on solid research techniques;
- Equalizer: by applying grounded theory qualitative research is brought on par with quantitative research/research methods because the language of grounded theory is applicable to and is known by quantitative researchers (e.g. *data, validity, rigour, systematic,* etc.);
- Acceptability: research- and ethics committees also find the formal terminology of grounded methodology acceptable when evaluating proposals for research application approval;
- Publishable: the above applies to article review as well since editors (as gatekeepers of new knowledge) of academic journals find justification for acceptance and publication in the scientific methodological processes of grounded theory;
- Structuring research in a new field: researchers find that the tenets of grounded theory (inductive reasoning and theory generation from data) and its methodological guidelines help to structure their research. GT methodology also precludes the need for hypotheses and theoretical argumentation at the onset of their research ("no pre-formed concepts of knowledge or reality" is a grounded theory principle; Jones and Alony 2011:98);
- Theoretical sensitivity: this important attribute of grounded theory sensitises the researcher to subtle nuances in the data which the researcher is able to identify and conceptualise as concepts, categories, relationships and emerging theory.

The study under discussion relates very well to the properties mentioned as strengths of the GT methodology. For example, an investigation of ROP or research publication as perceived from a statistical support perspective points to a under-researched area without an existing theoretical backing. The structured approach is an attractive methodology and proves to be acceptable to ethical and research committees. Quantitative and qualitative data sources are included in the research and the research phenomenon appears to be multi-faceted and complex. This serves to emphasise the attraction of the methodology for the current study. However, the benefits have to be balanced against negative aspects of the methodology.

2.3.2.2 Weaknesses

Theory development capabilities versus theory verification

The one attractive property of GT method, namely the ability to develop theory, also presents as a weakness of the methodology because it narrows the application field of this method: developing theory and not validating existing theory. As Lingard, Albert and Levinson (2008:459) state:

> a higher level of understanding that is grounded in, or derived from a systematic analysis of data. Grounded theory (method) is applicable when .. the study… aims to explain a process; not to test or verify an existing theory.

This issue is also raised by several researchers: a theory can be developed using GT methodology but validation of existing theory requires the use of other methodologies (Ke and Wenglensky 2010; Creswell 2009:13, 229; Charmaz 2006; Strauss and Corbin 1990; Jones and Aloney 2011:97)

A method that is initially difficult to grasp

The comment by Suddaby (2006) that "GT is not easy" is in some respects justified. To a newcomer to the GT field, initially understanding GT method is no small feat. The fact that different versions of GT method have evolved over time (owing to different research philosophies and application fields) and that these versions have terminological differences[23] makes GT methodology difficult to grasp at first and demands dedicated time from inexperienced or new users of the method. To new/ inexperienced researchers the volume of available information on GT, reported from different philosophical and application approaches, is overwhelming and the choices seem endless. Questions arise as to whether different versions of grounded theory exist; which version/s is correct and whether more recent versions are more effective to use. For example Tan (2010:95; 108) comments that earlier philosophical and conceptual foundations and methods become less applicable and justifiable as newer and more applicable insights evolve from the different research application areas. Should such a comment be considered as the final word? Researchers remark that there is no easy way of growing into GT methodology. Questions like these often affect researchers' choice for or against GT methodology (Fendt and Sachs 2008:432, 439, 441, 447; Bryant and Charmaz 2007a: 19; Mills et al. 2006: 29; Bryant 2003; Jones and Aloney 2011: 97; Suddaby 2006:633).

For new/ inexperienced GT researchers, time is required to sort through the different philosophical approaches of GT application, to position themselves on research philosophy and to decide which GT version to implement. In this regard, Charmaz, for example, proposes a less objectifying approach to GT (2006:10). Tan (2010:108) compares Charmaz's version against founding versions: for example Glaser's approach allows creativity but runs the risk of loss of "coherence and focus" and Strauss and Corbin's version tend to be "formulistic and inflexible". Charmaz adapted grounded theory by acknowledging pragmatist principles but also advocates constructivist reasoning. This lends a more open-ended approach[24] to the GT method than the more classic and pragmatic grounded theory version of Strauss (Charmaz 2006:184). Charmaz's stance has moved away from the Glaserian school who believe that emerging theory should be as objective as possible and that data should remain separate from the scientific observer (Charmaz 2006:10 and Glaser 2002).

[23] The Straussian version of GT method for example uses the terminology *coding paradigm* and *axial coding* not used in Classic/ Glaserian GT. Glaserian GT uses the term *theoretical coding* that is not used in Straussian GT method (Kelle 2007).

[24] More than one possible explanation for a researched phenomenon can be offered (Charmaz 2012)

GTM and coding is time consuming

Closely linked to the difficulty in initially comprehending GTM is the drawback of time. Time in this sense includes research time, effort and financial considerations. Although it is agreed that all versions of GTM conduct research in a systematic and structured way (refer to Section 2.3.1) some GTM versions dictate a more mechanistic and time-consuming means of collecting, analysing[25] and comparing data, and researchers admit that coding and analysis take time, is difficult and often tedious (Selden 2005:127; Fendt and Sachs 2008:432; Heist 2012; Suddaby 2006:637). Ke and Wenglensky (2010) write:

> … there is a tendency for researchers to become lenient in their application on the rigid and time consuming process of data analysis. Grounded theory is time consuming and often frustrating. This must be understood.

Fendt, in Fendt and Sachs (2008:430-455) for example, reflects on the completion of a methodologically correct Straussian grounded theory application and on her disillusionment with time and *cost-benefit* considerations when strictly adhering to formal grounded theory methodology. Fendt argues that the time spent in rigid and time-consuming application of the "orthodox" GT methodological guidelines (classic grounded theory of Strauss and Corbin) does not necessarily lead to a sounder explanation of a specific research topic than would a less onerous version. The drawback that Fendt argues in this instance is that the very strength of grounded theory (theory development) is undermined – and the quality compromised – by too stringent objectification processes. This overemphasises the *method* to the detriment of the *explanation* of the researched phenomenon and theory emergence. The balance of good quality research must be weighed against cost (financial, quality research, time and effort).

Another time-aspect that could become a drawback is the amount of time theory takes to evolve from the data. The time required to develop a mature theory is indicated by Holton (2007: 286; Glaser 1998:220) in that GT practice requires time, a thorough understanding of methodology, skills and experience. They also state that conceptualisation and theory formulation grow from mature data. This requires time and repeated sampling and analysis. To this Glaser (1998:50) adds that the researcher's subconscious thoughts have to mature into conscious concepts which happen over time. Forcing the process stunts creativity, energy, conceptual abilities and results in theory development of poor quality. Researchers should pace themselves and the research process (Holton 2007:286).

The negative impact of poor/ ineffective data management

If a data capturing and management strategy is not designed prior to the time when data collection and analysis commence, data management can become a weakness of GTM. The same applies to documenting (memoing) ideas, conceptualisations and relationships that informally spring to mind or are observed during research. Montgomery and Bailey (2007: 65-79) stress that the documentation of ideas, perceptions and vague notions that researchers form during data collection are often problematic. Ineffective capturing and documenting increase the risk of losing track of ideas and concepts that casually take shape during data collection and analysis. Ideas are often

[25] Some versions regard data-elements to be coded as a meaningful event implied in a few sentences of data whilst other versions literally code word-by-word of collected data

suppressed by more recent information or confounded with information that is more recent and of relevance.

The argument of the potential for loss of information (and theory development) also applies to software[26] packages which support GT application. Many researchers support using software packages to facilitate grounded theory application (Creswell (2003); Richards (2005); Bowen (2005)). Bowen, for example, found that technology software (ATLAS.ti) provided valuable support with initial as well as second-level coding (by comparing against a pre-defined set of user codes). Computer literacy re quantitative software packages, researcher preferences and work style, time and the type of research topic under investigation are some determinants of the usefulness of software applications.

However, if researchers confuse the data management support-function of the software with unrealistic expectations that software can automatically develop theory (Holton 2007:287), theory development will suffer (Glaser 2005). Although software packages form an additional support tool to GTM, they can turn into a weakness which directly impacts on the results of GT research.

Theory development relies on the creative and conceptualising capabilities of researchers – something which technology cannot replace (Holton 2007:287). Inexperienced researchers often perceive applicable software as an easy way of implementing grounded theory. In this regard Tan (2010:97) warns that software packages serve as a supplementary tool in grounded theory analysis but cannot replace the researcher in identifying key categories and variables/properties. The researcher attributes of creativeness, continuous questioning, reasoning and meaning creation are essential elements in theory development.

Stern (2007:115) indicates that researchers can benefit from the storage and structuring functionality of software packages when organising and safeguarding their data (MacDonald and Green 2001; Milliken and Northcott (2003) but suggests that software has not advanced to the point where artificial intelligence can mimic human problem-solving capabilities, especially when applied to grounded theory research of a social and human interactive nature. Glaser (2005) confirms that software packages offer storage and retrieval support during initial coding and memoing but that software programs cannot creatively devise/deduce theoretical coding and conceptualisation.

Data management and documenting of conceptualisations form an integral part of GTM. Improper and ineffective management is a distinct disadvantage of the method.

The occurrence of over-objectification in GTM is a drawback of the method

The possibility of over-objectification of developing theory is seen as a drawback of GTM. Over-objectification is explained by recounting Fendt's experience (in Fendt and Sachs 2008:431, 432-440) with Straussian grounded theory application which revealed that a meticulous mechanistic application of coding methodology held the risks of over-objectification, knowledge loss and stifled creativity. Fendt experienced that the fracturing of data into data elements brought distance

[26] ATLAS.ti, NUD*IST, NVivo, HyperQual and HyperRESEASRCH are examples of qualitative data software packages

between the research environment, participant and researcher, and the research context. The over-objectification was the result of the line-by-line fracturing and labelling of knowledge elements followed by the gradual classification, categorisation and re-compilation and reduction of data into a conceptual relational whole (which constitutes the emerging research theory). Fendt and Sachs value the guidance and structure that grounded theory introduces to research (Fendt and Sachs 2008:435) but fear that the very methodology designed to capture knowledge might result in a loss of information when analysis becomes too mechanistically orientated resulting in an over-objectification of developed theory. Selden warns against the "technical tail wagging the theoretical dog" (Selden 2005: 127). During analysis, subtle nuances may be lost if coding becomes too mechanistic. An "objectifying procedural alchemy" (Fendt and Sachs 2008:440; Selden 2005:127) might lessen the voice of the researcher and suppress researcher creativity. Selden (2005:126) compares this situation to the "notes" of music without the "melody". Strauss's rigid methodology aims to ensure rigour, validity and reliability but these qualities should not be pursued at the expense of effective knowledge discovery.

Although the GT methodology offers a way of methodically analysing vast amounts of unstructured data – which makes the methodology attractive to researchers - the crux of grounded theory enquiry is to describe how participants experience *their* reality. Over-objectification removes the participants' experiences of real life situations from the eventual developed theory (Fendt and Sachs 2008:432; Gephart (2004:547) and therefore presents as a weakness of GTM.

Ability to develop theoretical sensitivity

Despite the systematic and scheduled sequence of the GT process Suddaby (2006: 637), an experienced GT researcher, observes that grounded theory is not a routine application of formulaic techniques to data: researcher initiative and insight are necessary for the development of rich sensible theory. Insight (and initiative) in this sense refers to theoretical sensitivity. A lack of theoretical sensitivity or the inability of a researcher to grow his/her theoretical sensitivity is perceived as a risk or drawback to GT application: without the necessary sensitivity an in-depth developed theory is probably not possible.

Researchers applying grounded theory methodology are often disappointed when coding does not lead to more than the description of the researched process or phenomenon. The problem often lies in researchers' inability to elevate their coding to a conceptual level (Suddaby 2006:636). This inability may be attributed to the fact that the research has not been executed with sufficient theoretical sensibility (Locke 2001). Lock explains that low-level coding emerges as higher-order conceptualised structures only when the research process moves forward, consistently supported by the researcher's ability to conceptualise and recognise underlying structure (theoretical sensitivity).

Holton (2007:265) also notes the challenge of moving low-level coding to concept development, and adds that the challenge often lies in researchers' lack of *confidence* in their ability to conceptualise and their inability to trust the concepts they identify. Confidence enables researchers to identify and promote categories/conceptualisations. This again addresses the issue of (mature) theoretical sensitivity and confidence in applying theoretical sensitivity. Holton adds that researchers often fail to move conceptualisation forward for fear of "leaving data behind". GTM should first and foremost be about conceptualisation and identification of relationships between categories and constructs.

The researcher with a developed theoretical sensitivity will not be intimidated by the idea of 'letting go' of data-descriptive code in favour of higher order conceptualisations (Holton 2007:266). The fact that rich theory development depends on researcher insight - and thus theoretical sensitivity - identifies sensitivity as a vulnerable or weak link in GT method.

Inappropriate implementation of or reference to GT creates academic scepticism

Grounded Theory has evolved over the years into a tried-and-tested method because of frequent use and a broad application field. This was previously mentioned as a strength of GTM. However this strength at the same time proves to be a weak point because popularity of a methodology can lead to inappropriate use or exploitation. These actions can in turn kindle a sense of mistrust in the academic community towards GT methodology. The weak point therefore actually lies with inappropriate use which in turn impacts on the methodology.

Inappropriate use has resulted in GTM, and subsequently GT research findings, being referred to as "airy fairy" research (Bowen 2005: 208) and as a methodology that acts as a "bumper sticker" to lend academic respectability to research endeavours (Barbour 2001:1115). The literature comments on GTM as an "overly generic" way of referring to qualitative research when a vague description of qualitative research methodology is required (Rynes 2006:6333). Haig (1995) states that grounded theory can be a useful "umbrella term" to obtain approval for research proposals. In an editorial column for *The Academy of Management Journal* (2006:633), Suddaby refers to the misuse and misconceptions around grounded theory as "a rhetorical sleight of the hand":

> Grounded theory is often used as a rhetorical sleight of the hand by authors who are unfamiliar with qualitative research and who wish to avoid close description … of their methods. … [such authors] hold some serious misconceptions about grounded theory.

GTM is, in essence, a sound analysis strategy. The component of constant comparison (of conceptualisations and code) in GTM ensures that, when GTM is effectively applied, robust theory evolves. The scepticism created by inappropriate use is therefore an unfortunate occurrence that could impact on the evaluation of research outcomes.

The risk of theory pretence when true theory is the objective

Ignorance about GT method may lead to 'theory pretence' (Suddaby 2006:635). Incidences of theory pretence occur when studies offer as their developed theory a mere description of a research phenomenon without substantive theory development. The researched phenomenon is described in detail, but abstract conceptualisation and relationship development are absent:

> Many researchers produce an artificially neat and tidy account that is descriptive rather than analytical and which militates against formulating in-depth analysis. A list of 'themes' are provided and the reader is invited to take it on trust that theory somehow emerges from the data without offering a step by step explanation of how theoretical insights have been built up (Barbour 2001:1116).

According to Tan (1997: 106), theory pretence is often the result of research endeavours that only address the "what" component of a researched event: "what is going on here". Strictly speaking, a grounded theory study should query the "what and how" aspects of an event, form conceptualisations from the data and conceptualise the relationships between generated categories.

Ke and Wenglensky (2010) emphasise that the focus of a study should not move from abstraction to description if concepts start to emerge. According to Ke and Wenglensky, the very purpose of detailed description is to act as a basis from where conceptualisation evolves and moves to a higher level of abstraction. Ke and Wenglensky state that description is not theory development and cannot be substitute for theory. The two outcomes are not interchangeable: true theory development is about conceptual abstraction and relational links between constructs.

The risk of theory that turns out to be theory pretence instead of true theory in GT application is a weakness of the methodology and would basically label a research endeavour unsuccessful.

2.3.3 GTM as methodology option: weighing the strengths and weaknesses

The literature review on the strengths and weaknesses of GT, discussed in Section 2.3.1 and 2.3.2, brings valuable insight into the capabilities and limitations of GT: what grounded theory is and is not. In this way one can form a realistic expectation of the type of research that can be undertaken with GTM. Weighing pros and cons strengthens the conviction that GT methodology is a suitable inquiry mode for the topic of this research, namely *research output proficiency*. The review furthermore creates awareness of methodological issues and available options that have to be considered and motivated in research. The rest of this section (Section 2.3.3) will recount the further motivation for GT methodology deduced by balancing the pros and cons of the method. GT-choice then opens up the discussion of the timing of reviewing literature in GT research (section 1.4) and the initial literature review of this study to determine the knowledge gap in the field in section 1.5

Strong evidence for the choice of grounded theory

In summary, the strengths of GT listed present GTM as an obvious choice for this study. The fact that GTM has developed into a robust technique (because of popularity and exposure to many diverse research fields); is well suited to under-researched fields where the theoretical base is limited or non-existing; has theory-generating capabilities; is applicable to many subject-specific research fields; has the capability of analysing complex systems; offers a systematic and extensively used and refined methodological research process; has qualitative as well as quantitative research/analysis capacity; has developed into a methodology that is on par with quality standards of quantitative analysis methodologies; is recognised by academic committees and publishers as an acceptable research methodology; and has the capacity to structure, and create in-depth understanding and explication of a research topic, motivates the choice of GT for this study. The next paragraph explains how the negative points of GTM can be accommodated to support the choice of GTM.

Knowledge growth: choices have to be made and explicated

The information gathered on the weaknesses of *GTM* (section 2.3.2) reveals aspects of grounded theory that can jeopardise research. It is therefore a productive exercise to study the weaknesses of the process because weak points forewarn against potential pitfalls of the method. Section 2.3.2 indicates that weaknesses can be attributed to various conditions, for example, ignorance and misunderstanding (e.g. GTM is not a theory validation method); improper use of techniques; too stringent adherence to method without researcher insight; mechanistic application of method; theory pretence without adequate theoretical sensitivity; over-objectification; initial confusion over different versions of GTM in use in research; underpinnings of different philosophical beliefs in GT

work (please refer to Chapter 3); and the voluminous amount of literature on GTM and GT research that initially make it hard to grasp the essence of GT methodology.

Awareness of pitfalls ensures that the researcher comes prepared when engaging in GT research: ensuring that he/she understands the basic assumptions and methodology of a specific version of GTM; does not apply the method too mechanistically; is informed on theory structuring; and manages data capturing and data queries efficiently, to name but a few aspects that serve to equip researchers.

The motivation of the choice of GT method as methodology for the current research clears the way for further investigation into the format of an initial literature review in GT research and how literature should be reviewed in GT research (section 2.4).

2.4 The timing of the GT literature review: what does the literature say?

As motivated in Section 2.1 of this chapter, literature plays an indisputable role in any research endeavour. This also applies to grounded theory application as well (Stern 2007:123). Stern uses the parallel of Robert Burton's dwarf standing on the shoulders of the giants: the dwarf (current researchers) can see further because of his position on the shoulders of the giant (work of other researchers) (Bartlett 1980:258). New development and innovative thought in recent research build on the research knowledge which earlier researchers report in the literature. Without (prior) knowledge researchers would not be able to advance research, innovation and discovery. The work of giants has to be acknowledged and, at the same time, these works are required to develop, mature and sensitise the researchers following in their footsteps. GT is on par with other research approaches about the critical role of the literature in research, but, is however concerned about the timing of the use of literature in research: The "*how-to, when and where"* of literature use in GT application – the timing of the use of literature.

Timing has been a much debated issue in GT research ever since the initial development of the method (McGhee et al., 2007: Walls et al., 2010; Dunne 2011). The question of why the timing became an issue stems from the *open mind* principle of the methodology described in Section 2.3.1.3. The open-minded principle argues that during theory development a researcher's mind should be free of preconceptions and open to new patterns and messages in collected data: the researcher's thoughts should not be preoccupied with preconceptions often associated with prior knowledge. Therefore, in the early years of GT inception, in an attempt to pre-empt preconceptions, the original developers, Glaser and Strauss (1967:37) proposed no review of the literature before categories and concepts begin to emerge from analysis of collected data (Bryant and Charmaz 2007; McGhee et al 2007; Mills et al. 2006) and therefore delaying the review of the literature. This positioning created the dilemma of keeping an open mind on the one hand, and, on the other hand, being informed on research development and the status-quo of research in a particular area of research at any given moment in time. Such information is required to identify knowledge gaps within a research field and ensures that the researcher contributes sensibly to the existing body of knowledge in a substantive area: aspects also required of researchers who seek research approval, apply for funding or present research proposals for post graduate studies. Furthermore knowledge assists in maturing researchers' scientific reasoning and developing theoretical sensitivity in their

substantive area, the latter being an essential researcher attribute in grounded theory reasoning (Glaser 1978; Holloway and Todres 2012:197).

In a recent article (2013) by Giles, King and De Lacey (2013:E29-E40), the authors indicate that in recent years opinions are increasingly swaying towards an early review of literature for various reasons: these include, for example, a well-developed theoretical sensitivity; improvement of the rigour of the research endeavour and, if the application-purposes of reviewing literature in grounded theory work is understood correctly, the stimulation of creative thought. The discussion which follows will highlight additional benefits of an early literature review. However the reality should also be recognised that researchers do enter into research with prior knowledge and experience (a fact which cannot be denied or undone). Such knowledge and prior beliefs affect how the researcher collects and interprets data. To put prior knowledge to best use, Giles at al. (2013:E29) indicate that researchers should accommodate such knowledge and probable preconceptions by recognising and reflecting on these suppositions, investigating and verifying these perceptions against independent data-evidence, constantly comparing against the data, verifying and refuting where necessary. In other words, strive to deal objectively with existing knowledge.

This section drew attention to the debate of the timing of a literature review in GT research. To motivate the literature-review stance of this research the sections that follow (Section 2.4.1 and 2.4.2) recounts (i) how a conventional literature review is approached (and the purpose of such a review), and (ii) how classic-, Straussian and constructivist grounded theory developers (Glaser; Strauss and Corbin; and Charmaz) position their literature reviews. This is followed by (iii) examples of how doctoral researchers managed their reviews of the literature. The experiences of McGhee; Elliot; Dunne; and Marland are recounted here. Based on these discussions (iv) Section 2.5 explains how the review of literature is to be managed in this research. Section 2.6 follows with an introductory literature review on ROP.

2.4.1 GT developers' stance on reviewing the literature

With regard to the timing and format of a literature review, Creswell (2009:27) explains that the placement of a literature review in research/ or a thesis may vary. It may be placed either as part of the introduction to frame the research topic; or as a separate section (e.g. Chapter 2 of a thesis) – which is usually the case in traditional/ or post-positivist research; or at the end of a thesis or report. The last mentioned could for example apply to GT application where existing theory is not available on a research topic at the onset of the study. The message of Creswell's discussion is that the placement of a literature review in theses is not cast in stone ('must-be-chapter 2') and that placement may vary and may be placed where appropriate.

Apart from placement, content and format of literature reviews also vary depending on the purpose of the review at any specific time in the research. It may be to introduce, motivate or position the research topic in the research field; it may be to recount what has been done and what is known in the field; to motivate knowledge gaps; it may be to inform specific aspects of a component of a developing theory. The format of a literature review is therefore flexible and purpose-dependent. The next section describes how researchers of the three main schools of GT reason about the timing of reviewing literature.

2.4.1.1 The stance of the classic grounded theorists Glaser; Glaser and Strauss

The motivation of classic grounded theorists on the timing of the literature review

Barney Glaser (1978; 1992; 1998; 2001; 2005) and, Glaser and Strauss (1967)

In his article, '*Doing Grounded Theory: Issues and Discussions*' (1998:67-77), Glaser emphatically states that no literature review should be undertaken before a substantive theory has been developed:

> "Grounded theory's very strong dicta are: (i) do not do a literature review in the substantive area and related areas where the research is to be done, and (ii) when the grounded theory is nearly completed during sorting and writing up, then the literature search in the substantive area can be accomplished and woven into the theory as more data for constant comparison."

This reflects the standpoint of Glaser (1978) as well as Glaser and Strauss (1967) as the original developers of the grounded theory method. Classic Glaserian method argues that an early literature review is counterproductive to the open-mindedness required of researchers towards discovery and recognition of emerging concepts, issues and the interpretation of data: Prior knowledge may contaminate original and creative thinking. Glaser reckons that preconceived ideas and theory – gleaned from the literature - can introduce bias into the research which, in turn, will force theoretical sampling and interpretation of the data. The purpose of the delayed literature review is to ensure that developed theory fits well and is well-grounded in the empirical world – with the empirical world referring to the data (Glaser according to Thornberg 2012:244). In addition, an early literature review might focus on an area with no relevance to the substantive research area. Such research ("derailment") will be a waste of time and produce no results with irrelevant literature being searched. According to Glaser appropriate literature only becomes apparent once theory starts emerging from the data. Literature should only then be researched with the purpose of comparing, verifying, and refuting if necessary. Furthermore, at this stage, literature can be regarded as an additional secondary[27] data source. Glaser stresses the risk of speculation: the researcher runs the risk of speculating if he/she tries to compare and interpret emerging categories and concepts to existing theory. Theory should be allowed to grow from the data and only then be compared to existing theory (existing theory is regarded as preconceived notions). Relationships will emerge from the data if the researcher does not force the data into preconceptions of how the theory should function. A early review of the literature might cause an information overload and undermine the researcher's initiative to reason creatively and trust in his/ her ability to develop theory. Glaser cautions that research might become a rhetorical account of the literature – which will not stimulate theory discovery and development. According to Glaser such an environment will not grow theoretical sensitivity.

Glaser's opposition to an initial literature review is thus based on the risk of pre-conceived ideas – not derived from data – entering into theory development; irrelevant literature that might divert attention from the substantive area and jeopardise true theory discovery; ineffective use of time; and theory based on speculation. These prove to be serious objections and they warrant focused consideration.

[27] Primary and secondary data refers to data specifically collected for the study (primary) and the use of an already existing and available data (secondary data).

Reflections on the classic grounded theory approach to the literature

Acknowledging Glaser, and Glaser and Strauss' warning of preconceptions, the counter argument to this situation is however that researchers need to be informed up-to-date and knowledgeable in their substantive areas (Charmaz 2012:162, 164, 166; Stern 2007:123). A researcher's concern is to collate current information; collect information on existing theory and theory development in a research field and motivate the suitability of a methodology from the literature. Furthermore, a researcher has to explain the relevance and value of submitted applications or research proposals – with the required literature references in place (Lempert 2007; Wiener 2007:299). Researchers/doctoral students furthermore have to indicate to ethics committees and academic panels (for example UNISA's MDSP committee and examiners) that a particular research study is properly structured, planned and executable/ and or executed (Strauss and Corbin 1998: 51). Such proof has to include evidence of a researcher's knowledge that is ideally displayed in an early literature review in research reporting or in a thesis.

In addition it is argued that a limited knowledge of the substantive area will leave the researcher ignorant, even naïve and open to criticism. Thornberg (2012:244) argues this point in two ways: on the one hand, no knowledge of the literature means a loss of knowledge since what the researchers might construe as "new discovery" might already have been reported in literature and exposes the researcher's ignorance (Lempert 2007). On the other hand negating prior knowledge creates a situation of "naïve empiricism" which – barring prior knowledge - ignores researchers' historical links, research philosophies and socio-cultural heritage. Thornberg (2012:245) aptly argues (and he is supported in this regard by Dunne 2011 and Urquhart 2007) that a researcher's ability to reflect on the relations between existing theoretical concepts and what emerges/ develops from data should not be underestimated: researchers can learn from the literature without forcing the literature on emerging theory. By reflecting on prior knowledge and preconceptions, masking of preconceptions is ensured (Clark 2005) which leads to a more rigorous research approach.

Of concern to the researcher is also the fact that not reviewing the literature leaves the researcher "insensitive" to the substantive research area since insight into the research field is essential to sharpen theoretical sensitivity (Thornberg 2012:245; Strauss and Corbin 1998: 49-52; Dunne 2011; Gibson 2007:20) in Bryant & Charmaz 2007). Covan, (2007:68) for example, remarks that both Glaser and Strauss are skilled analysts because of their theoretical sensitivity, which (even 'unknown' to them) is rooted in prior knowledge in their minds. Their theoretical sensitivity is so well developed because of the abundance of prior knowledge and experience seated in their minds: a wealth of 'latent' general knowledge in the social sciences/medical health care professions - knowledge that the less experienced researcher does not readily have available to strengthen theoretical sensitivity. Thornberg (2012:246) confirms this statement by indicating that Glaser is ambiguous in his stance on the literature: on the one hand he argues for no early review of the literature, but on the other hand he propagates theoretical codes[28] that are borrowed from existing theory.

The volume of literature on the issue of an early literature review is evidence of a movement towards a more lenient approach to reviewing literature in GT studies (Thornberg 2012:245). Example of researchers that support a more lenient approach include (as quoted by Thornberg)

[28] A typology of coding families which guides the conceptualization of how categories and concepts and related and linked

Bowen, (2006); Dunne (2011); Stern (2007); Bryant (2009) and McGhee et al. (2007). In this regard, Strauss and Corbin (1998) point out that a move towards a more active use of the literature, even at the onset of the research, will increase theoretical sensitivity, suggest conceptualisation principles and questions to ask of the data. Strauss and Corbin stress the advantages of an early literature review on condition that creative thought is not stunted.

2.4.1.2 The stance of the Straussian grounded theorists: Strauss; Strauss and Corbin

The motivation of Straussian theorists on the timing of reviewing the literature

Strauss 1987); Strauss and Corbin (1990; 1998):

Apart from the fact that Strauss and associate Corbin (1998) placed more focus on a step-by-step structured method than did Glaser (1967) in his more inductive approach, they also differ on the timing of reviewing the literature in research and advocate an early review of relevant literature in the substantive area. This move was another reason for the split between Glaser and Strauss (Evans 2013; Dunne 2011).

Strauss and Corbin (1998:47-53) base their more lenient approach of the literature on arguments that all link to *how* and why the literature is used. Their motivations include the development of theoretical sensitivity; the formulation of preliminary research questions early in the research; clarity on the purpose of the research endeavour; suggestions of concepts to investigate; ordering of emerging concepts; generic suggestions on how concepts can be integrated into theory formulation; a stimulus towards innovate thought; a means of controlling researcher bias; and an aid in reflecting on preconceptions (McCallin 2006: 6169-6181).

These motivations present as convincing arguments. Theoretical sensitivity, for example, is an invaluable researcher skill that enables the researcher to detect fine subtleties in data that might point to properties and dimensions of an emerging concept; and, on occasion such an emerging concept might be recognised as similar to a concept/s described in literature. Comparing and contrasting the emerging concept against a described concept adds to the refinement of an emerging concept. Sensitivity is required throughout the analysis process – especially at the onset of research (Strauss and Corbin 1998:49). Literature can furthermore serve to suggest interview/ survey question formulation. This again applies especially at the onset of research when the research field is still unknown and uncertainty exists regarding the way forward (Strauss and Corbin 1998:51; McCallin 2006:6171). As research progresses, participant responses gradually take over this role and suggests question refinement (replacing the literature). In the initial phase of research the literature assists in clarifying the general research purpose of the study and suggests probable concepts to be investigated. As theory develops these initially suggested concepts may perhaps fade from the evolving theoretical model or feature less prominently than suggested in the literature but some concepts may remain and be integrated into the theory. Reviewing the literature also stimulates innovative conceptualisation. In this regard McCallin (2006:6171) comments that innovative thoughts spring from a "prepared mind' – referring to knowledge gained from relevant literature (Strauss and Corbin 1998:47). Literature thus serves to support conceptual ordering in research. Knowledge of relevant literature furthermore assists in controlling bias in so far as reflection on messages from the data, the literature and personal convictions becomes discernible. Being able to discern meaning prevents the researcher from forcing meaning onto data; it sensitises the researcher (Strauss and Corbin 1998:47).

In their argument for an earlier review of the literature Strauss and Corbin (1998) however also stress Glaser's concern pertaining to an information overload that might suppress initiative and innovative thought in inexperienced GT researchers. This may leave researchers in "awe" and "paralysed" - as Strauss and Corbin (1998:49) refer to such risks. Subsequently an overload might jeopardise true theory development and rigorous research.

The arguments cited in this section for a more flexible position on reviewing the literature seem very convincing and are supported by, for example, Giles, King and De Lacey (2013:E29) who elaborate on evidence of the benefits of an early review of the literature and provide mounting support for the early literature review movement in grounded research. The opinion of Charmaz (2012), to be discussed in the next paragraph, seems to address the problematic timing of reviewing the literature by arguing for a multi-phased review of the literature.

2.4.1.3 The stance of a constructivist grounded theorist: Kathy Charmaz

Preconceptions and an early review of the literature

Kathy Charmaz (2007; 2011; 2012):

Kathy Charmaz, a founder of constructivist grounded theory and a former student of Glaser, adds her voice to the debate on when literature should be reviewed by stating that it is a contentious and often misunderstood issue (Charmaz 2011:165). In her opinion Glaser's objection to an early literature review is an attempt to prevent researchers from perceiving new theory through the research lens of other researchers - the risk of so-called 'received theory' that forces the data (Glaser and Strauss 1978). Without preconceived notions innovative theory development is stimulated. An early review of literature may give rise to suppositions. Charmaz comments that, in addition to literature-preconceptions, researchers also bring prior knowledge and experience to the research table (Charmaz 2011:165) that influence the meaning researchers attach to data. This is affirmed by Strauss and Corbin (1990:48) who state that all researchers possess a latent professional and disciplinary literary knowledge acquired in earlier work and/or life experiences. Prior knowledge, experience and perceptions are a given and the key lies in how the researcher manages prior knowledge and literature (Strauss and Corbin 1998:47).

Managing prior knowledge, preconception and reviewing the literature

Ways to manage prior knowledge (and literature) may be to 'ignore' such knowledge or to declare prior knowledge and preconceptions. Glaser, for example, ignores prior knowledge when he advocates "no early literature review" and idealises a *tabula rasa* mindset for researchers. The purpose of the dictum is to allow categories and concepts to be grounded in the data. Charmaz however points out that Glaser himself is well versed in several subject specific research areas and virtually represents "a literature review on tap", as she refers to the wealth of knowledge in Glaser's mind (Giles et al. 2013:E32, Bryant and Charmaz 2007). Glaser's dictum therefore seems impossible to abide by and offers only an ideal to strive towards (Giles et al 2013:E32). Glaser himself also admits his own dilemma (Glaser (1978: 72). Dey (1993:63) aptly responds, indicating that an open mind does not imply an empty head (prior knowledge is a given). A *tabula rasa* and no prior theoretical knowledge is not possible (Blumer 1979; Dey 1999 and Layder 1998; Charmaz 2012:165).

Another way to manage prior knowledge and literature would be, as mentioned, to declare existing knowledge in some way or other. Charmaz prefers this approach and agrees with Henwood and Pidgeon's (2003:138) "theoretical agnosticism" approach which holds that literature and existing theory should be critically regarded and then be allowed to "lay fallow" until such time as categories, concepts and substantial theory start to crystallise (Charmaz (2011:166). An example in this regard would be institutional and ethical bodies' requirements of a preliminary literature study in research proposals submitted for approval. In such instances, Charmaz suggests an initial literature review for the sake of the proposal that is then set aside till theory starts to evolve from the data.

In addition, an initial literature review provides a beginning framework for research; improves understanding of the research field and orientates the research study (Lempert 2007; Giles et al 2013:E32; Charmaz 2007). Charmaz also believes that a thorough and integrated literature review – interwoven throughout the text/ thesis - will elevate the quality and rigour of the research and contribute to true theory development (Charmaz 2011:166-167). This comments is important in that it suggests a format for a literature review integrated or distributed throughout the entire thesis/ or report. This presents as a fourth literature review format to those suggested by Creswell (please refer to the introductory section 2.4.1). This suggestion was seriously considered for this study.

Constructivist approach to reviewing the literature

The constructivist approach, in the voice of Charmaz, thus suggests an initial literature review to adhere to academic institutional research requirements; orientate the researcher in the initial stages of the research; and to provide an introductory structural framework for research. Once requirements and initial orientation has been met, the initial review is then allowed to lie fallow till the appropriate theory development stage is reached and the original review revisited, elaborated on, integrated and interspersed throughout the thesis – from commencement phase to description of the theoretical model.

Of interest to this study are the guidelines that Charmaz (2011:163-169) proposes on literature application in grounded theory, and by implication the timing of reviewing and presenting literature:

- A mediating stance of 'theoretical agnosticism' towards existing theory should be followed in the research process, but more so in the initial data-collection-and-analysis phase until categories and conceptualisation are underway: then compare developing categories, conceptualisation and attributes with existing literature to confirm or contradict concepts of existing or similar or generic theory
- The iterative collection-and-analysis methodology of grounded theory can be used to frame the sequence of literature to be reviewed: to enrich what has been addressed in the (previous cycle) developing theory.
- The literature should be managed objectively so as not to stifle researcher creativity and hinder the emergence of new and innovative theory ('don't strangle the theory' Charmaz 2012:166).
- An initial literature review can introduce the research process that the researcher aims to follow. (Charmaz (2012: 166) refers to such a review as a 'scanty'[29] review). This implies that an initial literature review can be used as commencement phase data source in GT research. This

[29] The researcher of this study would like to interpret a scanty review as a descriptive review of events reported in the literature which has relevance – in some way or other - to the research topic – at this stage avoiding discussion and the influence of existing theory.

comment directly impacts on the research process of the study under discussion (Please refer to Chapter 4 in this regard).

- Literature can also be integrated throughout the description of the data collection and analysis phase of the study to enhance understanding, compare, contrast and refine emerging theory.
- Once grounded theory has been (fully) developed – towards the final stage of the research - the most prominent literary works can be used to compare, refine and validate the substantive theory. Classic and modern[30] works should to be referenced. This assumes that older references be included in a literature review.
- Research and theory development cannot progress without reference to earlier research works because of the knowledge contribution of such researchers and should be acknowledged in research write-up (Bryant and Charmaz 2007).
- The motivation of the philosophical underpinnings of research also requires that literature be consulted and explained in the early stages of research (Charmaz 2012:163; Holliday 2002; Strauss and Corbin 1998: 50). Reviewing and integrating literature on a research philosophy is thus appropriate.

The discussion thus far on the timing of reviewing the literature leads to the realisation that, although grounded theory developers may idealise conditions for theory development (such as a tabula rasa approach), practical realities (such as prior knowledge and experience) and issues (such as institutional and ethical requirements) have to be accommodated in research application. This view is supported by Dunn, to be discussed in the next section.

2.4.1.4 The stance of a recent grounded theorist C Dunne

Sections 2.4.1.4 and 2.4.2.1 that follow both recount the experience of Dunne. In the present section his views are expressed as an academic on his insight regarding the original stance of no literature review in early research, and Section 2.4.2.1 then recounts his experience with reviewing the literature in his doctoral study using GT methodology.

In 2011 the views of a more recent group of researchers were voiced by Dunne (2011:116) in an article entitled, "*The place of the literature review in grounded theory",* where he proposes an early review of the literature. He motivates his stance by logically contrasting the most important arguments offered by Glaser (1978; 1992; 1998), and Glaser and Strauss (1967) for avoiding literature in the early stages of research against the merits of an early review.

Dunne (2011:116-117) indicates that many of the anti-early-review reasons stated by Glaser (1998), and Glaser and Strauss (1967) actually prove to be counterproductive to the research process and research principles:

- Grounded theory is very often implemented in research areas not previously researched, or in focus areas where very little is known about a phenomenon. Researchers apply grounded theory in such areas because of the theory generation property of the method (Payne 2007; Charmaz 2012; McCann and Clark 2003). Researchers have to be informed on the *status quo* in a research area so as not to duplicate what is already known in the field. McGhee et al. (2007: 339-340) express such concerns by asking how researchers are to motivate knowledge gaps in subject

[30] Charmaz's stance is that older literature should form part of research: this has been the viewpoint of the study under discussion and explains reference to works that precede the 2000 to 2015 period

specific areas if barred from reviewing the literature in that field? (Dunne 2011:116; McGhee et al 2007: 339-340)

- Glaser advises researchers to study literature in areas not directly focused on the substantive area of research, and not in the 'substantive' research area (Glaser 1998: 68). Dunne (2011) justifiably argues that without a review of the literature the researcher will not be able to pinpoint and demarcate the 'substantive' research area because he/she will not be sufficiently informed to demarcate the area. In the process the researcher would then, unknowingly, actually study an incorrectly assumed 'substantive' field with a naïve mindset. Dunne points out that Glaser defends his standpoint by arguing that time could be wasted researching literature that does not relate to emerging theory. However it can likewise be argued that studying literature in field/s not directly related to the 'substantive area' - as advised by Glaser – could also be a waste of time (Dunne 2011:117). Grounded theory advocates an open mind and researcher initiative. By placing restriction on researchers violates this basic assumption of grounded theory.

The purpose of an introductory literature review in any research (not only grounded theory application) is to, (i) motivate that the conditions and research environment of a particular study suit a specific methodological approach, e.g. grounded theory (McGhee et al. 2007; Coyne and Cowley 2006; Dunne (2011:116); (ii) that the research venture will not be a waste of time and resources because similar research has been conducted in the past (Chiovitti and Piran 2003); and (iii) that gaps in current knowledge exist that have not been explained by previous research (Creswell 2009). An early literature review furthermore (iv) informs the researcher on how the research field has previously been investigated; (v) orientates the researcher and (vi) contextualises his/or her study (Urquhart 2007); (vii) it develops the skill of theoretical sensitivity that is essential to GT research (Charmaz 2012; McGhee et al. 2007; Strauss and Corbin 1998); (viii) alerts the researcher to possible pitfalls which other researchers have stumbled across (McGhee et al. 2007); (ix) alerts the researcher to irrelevant or misleading concepts and conceptualisations (Maijala, Paavilainen and Astedt-Kurki 2003); and (x) assists in placing the research problem in a specific context in the research field, (xi) opens up a researcher's mind to the way forward (e.g. identification of potential primary and secondary literature sources), and (xii) organises the researcher's current knowledge base, encouraging "clarity in thinking about concepts and possible theory development" (Henwood and Pidgeon 2006: 350). These critical criteria cannot be ignored and lead to the question of the next paragraph, namely what an initial review should contain.

Dunne (2011:117) justly argues that researchers who are not informed on research developments in their field are left naive and open to critique. The crux of Dunne's argument supports the movement towards a more lenient literature review perspective and focus on the on the management of existing knowledge. Existing knowledge cannot be ignored/ or denied:

> ..the important insight lies rather in how to make proper use of previous knowledge (Dunne 2011:117).

The question is actually *how* to use literature knowledge, which Dunne resolves by suggesting an early review of the literature:

> Collectively these arguments in favour of undertaking a literature review in the substantive area *before* commencing data collection and analysis are compelling.

Urquhart (2007:351), Suddaby (2006: 635), Lempert (2007: 246-264) all share this view by stating that a researcher needs to be informed and that knowledge of other/ existing theories will not necessarily influence or contaminate new theory generation. The ability of the researchers to discriminate between literature knowledge and insight gained from data analysis should not be underestimated. Suddaby (2006:635) states that there is a new movement in grounded theory towards a middle ground which acknowledges the open-mind principles of grounded theory and simultaneously emphasises the need for knowledge on existing theories in the substantive area; a drive to:

> …. achieve a practical middle ground between a theory-laden view of the world and an unfettered empiricism.

The discussion of the research experiences of four doctoral research students which follows in Section 2.4.2 below suggests support for the movement towards an early/or introductory literature review.

2.4.2 Student researchers' stance on reviewing literature in GT theses

2.4.2.1 Dunne's experience as a GT doctoral student

A useful and logical guideline to the literature follows from Dunne's (2011:119-121) description of his experience in organising and dealing with the literature in the early stages of his doctoral research. Dunne read extensively on his substantive research area by splitting his research topic into its basic components and closely reviewing the existing theory and research findings in these primary areas – this is very similar to an approach followed by Elliot (2012) discussed in Section 2.4.2.2. Dunne found this early review very fruitful in refining his research question; gaining in confidence with the contextual positioning of his own work in the greater research field; improving his knowledgeability of the field; focusing and delimiting his research; and, importantly, identifying knowledge gaps in the substantive field. The last mentioned served to motivate his research (a similar approach was followed in the research under discussion, please refer to Chapter 1). The early review of the literature also proved to be very fruitful in pointing to existing/possible misconceptions: the study dealt with *inter- and cross-cultural student relations in HEIs* (Higher Education Institutions) and existing research pointed to the grave consequences of confusing *nationality* with c*ulture,* which Dunne could accommodate in his research. Dunne could plan for and anticipate *nationality/ cultural* confusion because of insight gained in his review of the literature. Dunne regards the early literature review as a necessary and essential phase of his grounded theory research which eased insecurity caused by insufficient knowledge. In addition, the early review guided and structured his research.

Theoretical preconceptions linked with prior theoretical knowledge are regularly linked to the issue of reviewing literature early in grounded theory work. Researchers often embark on grounded theory research with a strong theoretical background in their substantive area (previous studies/ research experience). This applied to Dunne as well: through tutoring responsibilities and academic involvement in the School of Language and Intercultural Studies at Dublin City University, Ireland, Dunne accumulated a wealth of prior theoretical knowledge. He recounts that he managed the *use* of his prior theoretical knowledge in the early stages of his research by setting existing theory aside in his mind and allowing conceptualisation to form from the data. Dunne did not deny his existing

theoretical knowledge (in fact he acknowledged this) but avoided interpreting his data through the lens of existing theories. He was aware of the preconception burden that existing theory can create. As concepts, relations and theory started to develop, Dunne addressed his preconception burden in a manner true to the constant comparison principle of grounded theory: on the one hand he constantly asked whether his existing theoretical knowledge could advance and contribute to evolving theory, and on the other hand, he constantly identified new theory to explain unexpected or contradictory messages that emerged from the data. This strengthened the rigour, quality and profundity of his research. The constant comparison process, used in this way, alerted the researcher to emerging concepts. For example, in his study field Dunne was aware of *social relations concepts*, but events emerged from the data that suggested "*usefulness of other people"* in *cross-cultural social interaction* - something not previously considered in existing theories. He discovered that students weight the sense of *cross-cultural social interaction* from the vantage point of "*what benefits will I reap from this social cross-cultural interaction*?". Sensitivity to the message of the data, coupled with an open but critical mind to prior theory/ theoretical knowledge on *cross-cultural student relations,* contributed to the emergence of a totally new dimension of *cross-cultural student relations* theory.

The experience shared by Dunne not only attests to the benefits of reviewing literature in the initial stages of research, but also provides an example of managing existing knowledge. Dunne's open, but critical, approach to the incorporation of existing theoretical knowledge in the advanced stages of his research when conceptualisations take shape, strengthen the argument of Thornberg (2012:245) and Urquhart (2007) that the discretionary skills of researchers should not be underestimated in managing prior knowledge and experience.

According to Dunne, the placement of the literature review/s in doctoral studies is not solved once the *use* of literature has been clarified. He recognises that academics often prefer a conventional approach to the thesis structure and doctoral candidates are urged to explain and motivate their positioning of the literature review/s in their theses. (The research under discussion endeavours to do the same with the inclusion of Sections 2.4 and 2.5in this chapter). The benefits of an early review have been discussed comprehensively: the placement and format of such an initial review depends on the type of study and the discretion of any particular doctoral candidate-researcher. (For his own purposes Dunne preferred an initial review - conventionally placed –to contextualise his work, clarify his research question and focus his research, but he refrained from incorporating a theoretical discussion in the introductory literature review). Dunne furthermore makes practical suggestions on how to manage additional literature used in the constant comparative phase of the research. This refers to literature used to verify, conceptualise the meaning of the data, and formulate new theory that develops from the data and which is compared against appropriate concepts, categories, relations and theory from the literature. Dunne suggests that for the sake of clarity and so as not to distract attention from the focus of theory development, a second, consolidated section on the literature be incorporated towards the final stages of theory formulation in the thesis[31]. The consolidation review should then elaborate on the continual comparisons made between emerging

[31] This viewpoint differs from Charmaz's (section 2.4.1.4) viewpoint of an integrated literature review dispersed in the text and presents as a fifth literature review format to the three formats suggested by Creswell (2.4.1)

categories, concepts, relations and theory from data and existing literature. Alternatively literature can be interspersed with text (as also suggested by Charmaz, Section 2.4.1.4) that relates data collection and analyses events. This however leads to very bulky literature-analysis discussions that may be difficult to follow. Dunn suggests that in the analysis section it may be preferable to mention only briefly the literature applicable to an analysis-situation and refer to the separate literature discussion section than crowding the analysis section with too much information. By referring comparative existing- and emerging theory discussions to a separate literature section attention is not deferred from emerging theory.

The practical experience of Dunne presents a logical option to consider for reviewing and managing literature in a thesis, and has to be weighed against the text-interspersed suggestion of Charmaz (Section 2.4.1.4). Elliot's experience, discussed in Section 2.4.4.2.2 that follows, likewise illustrates careful consideration of the management and use of reviewed literature in research.

2.4.2.2 Elliot's experience at Queen's university Belfast, UK

Elliot (Elliot and Higgens 2012) relates her experience with grounded theory research which she conducted as a doctoral student at Queens University and quotes some of the authors (Bryant and Charmaz 2007; Luckerhoff and Guillemette 2011; and Walls, Parahoo and Fleming 2010) that voice their concerns about the purpose, timing and placement of an initial literature review in grounded theory write-up. These authors state that thesis format is of particular concern at European and Canadian academic institutions that oversee grounded theory doctoral studies. Non-conformity of opinions on the dictum of no initial literature review in theses remains the centre issue of contention.

In her article Elliot mentions that she was well aware of this controversy and approached her initial literature review by 'scoping'[32] the literature on her substantive research area. Her focus area was *clinical decision-making in advanced nursing practice*. This is similar to Dunne's approach to his doctoral research which is reported in Section 2.4.2.1[33]. A more in-depth literature study on the general topic of *decision making* followed and was reported in a research proposal application (complying with conventional thesis structure requirements) as the introductory literature review. This review, similar to Dunne's initial literature review, served the purpose of determining what was known in the research area; formulating the research question; and identifying knowledge gaps (Hunter A, Murphey K, Casey D, and Keady 2011: 7). In this way Elliot justified her study. (Little research had previously been done on *advanced practitioners' decision-making in community care settings* which therefore identifies a gap in the substantive area). Elliot relates that the literature review also served to contextualise her research and orientate her in the substantive area - similar to the objectives mentioned by Dunne (Refer to 2.4.2.1). However Elliot and Dunne's viewpoints on the use of existing theory and literature during the initial stages of the research differ considerably: during initial data collection Elliot refrained from using her literature to guide initial compilation of interview questions but stuck to neutral questions as suggested in classic grounded theory method (Glaser 1998:123). Elliot stuck to this approach because she was cautious of forming preconceptions

[32] *Scoping the literature* refers to a review of the literature with the intent of establishing the extent of existing knowledge on a specific topic. This is similar to Charmaz's idea of a 'scanty' review in that the knowledge gap is not verified.[32] Grounded theory method is well established in nursing research. Scholarly books by authors such as Gerrish and Lecay (2006) for example attest to this

and introducing bias into her research. Dunne, on the contrary, used his literature review and theoretical knowledge with discretion, even in the initial stages of data collection and analysis, to enhance his theoretical sensitivity and ease the process of recognising emerging concepts from the data (which, Dunne indicates, proved to be worthwhile). Elliot 'ignored' existing knowledge (a classic GT principle) to abide by inductive-approach principles. In her review Elliot, true to the classic GT dicta, acknowledges that an extensive review of *decision-making* could affect her 'clean slate' approach to conceptualising emerging theory from the data. Dunne's comment on the fact that research circumstances differ for different studies (Dunne 2011:115) is applicable at this stage. He reports on his own extensive prior knowledge of theory in his substantive research area (prior research), whereas Elliot reports on a substantive area not previously researched where limited prior knowledge is available.

Elliot contends that the theoretical discussions that characterise doctoral dissertations can be left to the stage where new theory has developed 'fully': a final or reflexive literature review – echoed by Dunn in Section 2.4.2.1. Notwithstanding the fact that Elliot initially assumed that all grounded theory was conducted from a symbolic interactionist research paradigm - which could affect her theory development and interpretation - she eventually came to the conclusion that grounded theory need not necessarily be philosophy-bound: theory could still be developed if research is underpinned by a different research philosophy, but the meaning attached to data might differ.

Both Dunne and Elliot recommend an initial review of the literature even though their research conditions and environment; their motivation in approaching the initial literature review; and their way of applying knowledge gained from the initial literature review differs. In both cases the initial literature review serves - amongst other virtues – to orientate them in their research environment. The suggestion of a consolidated final review is also mentioned by both Dunn and Elliot while Charmaz prefers an interspersed-with-text format.

2.4.2.3 McGhee's experience, University of Glasgow, UK

The issue of the timing of the literature review is approached from a different angle by McGhee in McGee et al. (2007:335-339; 2005). McGhee, in the article by McGhee et al., recounts his doctoral research experience at the University of Glasgow and focuses on the fact that the method of grounded theory is not a linear process but a concurrent, iterative, integrative process. McGhee's research focuses on the relationship that develops between professional key health care workers (the professional official that liaises with the carers) and dementia carers that work in the home environment (McGhee 2005). Similar to Dunn's situation, McGhee was already well versed in his subject area and the general subject area of nursing by the time he started his doctoral research. He attributes his knowledge to his current professional position and prior practical work[34] (community psychiatric nurse and mental health educator). At the onset of his research he had sound background knowledge of the professional literature in his field. This made McGhee very wary of forcing preconceived ideas onto the data. His caution is reflected in his *use* of the literature (and therefore the timing and placement of his literature review).

[34] This serves as an illustration of Charmaz's recommendation that prior knowledge be declared and dealt with is an appropriate way Section 2.4.1.4).

As explained in a later publication McGhee at al., (2007:338), McGhee indicates that during his doctoral research he decided that since literature is regarded as a secondary data source in grounded theory, he should refrain from using literature in his substantive area in the early stages of his research, up to the stage where categories emerge from the data. Only then did McGhee use the literature to ensure that categories and concepts were indeed grounded in the data. At that stage McGhee started using the literature to identify, contrast and contradict emerging grounded theory categories against the existing theory. In McGhee's case he decided on an integrated literature/analysis section in which comparative analysis-and-literature discussions were interspersed through his collection-and-analysis section of his thesis (similar to the view of Charmaz, Section 2.4.1.4). In addition he wrote a concluding, reflexive literature review (similar to Dunn and Elliot, Sections 2.4.2.1 and 2.4.2.2).

McGhee's supervisor supported him in this argument and indicated that he should follow the approach that he felt most comfortable with. McGhee therefore followed the interwoven literature/analysis route as well as a consolidation review. This concurs with Dey's (1999) stance that because researchers ignore literature at the onset of a study, this does not imply these researchers negate the importance of existing literature in research: McGhee entered into his research with a predisposition of the *patient/ carer* relationship because of (i) childhood memories of his grandmother caring for his grandfather suffering from dementia, and (ii) prior work related to his substantive research area.

This review on McGhee's research indicates that research circumstances and prior experience (such as child/ grandparent relation and nurse-carer/ dementia patient relationships) may vary which in turn can influence preconceptions and a researcher's stance on the management and timing of the literature review. Of relevance is the fact that McGhee motivated his later-stage literature review and reasons for his decision, which Cutcliffe (2000) regards as an essential element of an open and inductive approach to research methodology.

2.4.2.4 Marland's experience, Leeds Metropolitan University, Leeds, UK

Marland, who completed his doctorate at Leeds Metropolitan University in 2003, relates his doctoral research experience in a 2005 article (Marland and Cash, 2005). He structured his thesis to include an initial literature review (on par with Charmaz; Dunn; Elliot; but not McGee) on general aspects related to his substantive research area, namely, "*The medicine-taking decisions of patients with schizophrenia as compared to patients with asthma and epilepsy".* These included the medicine-taking-habits of patients in general (how they comply with a medicine-taking regime) and literature on a specific psychotic drug (neuroleptics). The initial literature review identified various dimensions of medicine compliance (how patients take their medication) and suggested a possible link between compliance and self-autonomy of patients. The literature review was general and a possible link to an 'unrelated' event was suggested in the literature (self-autonomy*)*. Glaser (2001) refers to this type of initial literature review as 'bundeling': a way of meeting the conventional academic criteria of ethical clearance and research approval. Glaser comments that such a background literature review does not weaken the research-need for theory development from data: the literature review was general – which enhances theoretical sensitivity by increasing researcher knowledgeability – and at the same time the initial review was not research area specific. Had it been the case, bias and/or data forcing could have been introduced into the study. Apart from identifying a niche research area,

an interesting advantage of reviewing the literature early in the research occurred in Marland's case: Marland reviewed the existing literature with a more detached and objective eye and discovered that compliance-preconceptions of decision making existed in the literature. This example illustrated to Marland the discriminating power of theoretical sensitivity, strengthened his sensitivity, alerted him to the effect of bias even in existing literature and opened the door to conceptualising new dimensions of medicine-taking *compliance.*

Marland's experience points to the value of a critical, analytical eye when literature is reviewed: his sensitivity to what he read in the literature enabled him to identify a bias component in earlier research. He attributes identification of the bias to a developed theoretical sensitivity.

2.5 The stance of this study on reviewing the literature

2.5.1 The general impression from the *literature* on reviewing the literature

The role that literature plays in any research cannot be disputed – the reviewed literature gives deserved credit to "giants whose shoulders" serve as vantage positions for further development - prior knowledge is indispensable. Examples include the work of Creswell (2009:23-45) on reviewed literature in general research practice and Charmaz (2012:162-169), Bryant and Charmaz (2007) and Strauss and Corbin (1998:48-54) on reviewing literature in GT application to name but a few. The GT literature reveals that researchers and developers are divided on the timing of reviewing literature for several valid reasons, but, as indicated in Section 2.4, the movement towards more flexibility in the timing of reviewing literature is mounting. This move is motivated by a deeper understanding of why objections to early review originated and how literature can be managed to avoid negative consequences of indiscretionary use of the literature at specific stages of GT research. The awareness that literature has different roles to play at certain times is strengthened. For example, literature fulfils the role of additional secondary data source and serves as an "analytical tool" in the constant comparative phase of theory development, whereas an initial review of the literature serves to orientate the study and identify gaps in research knowledge.

With these lessons learnt, this section summarises the format of literature review options applicable to GT research –as understood from this investigation of the views of developers and researchers of GT method. The section then indicates the stance of this study on the format of the literature review to be included in this thesis.

2.5.2 Literature review formats in theses: available options for GT researchers

The standpoints of grounded theorists and experiences of researchers on reviewing the literature, (Section 2.4) serve to emphasise that the use, purpose and reporting of reviewing literature are intrinsically linked to the GT researcher's perception of what an open-mind signifies and how literature should be managed to ensure an unbiased open-mind. The investigation into the viewpoints of GT developers and researchers (Sections 2.4.1 and 2.4.2) suggest different combinations of an *introductory literature review; a review interspersed-with-the-text; and a consolidation review*. The four most practical combination options are the Following:

- *A single literature review interspersed with the text of the collection, analysis and theory development cycles of research reporting*

True to the non-linear nature of the grounded theory method literature discussions are interspersed in the thesis in the constant comparison and analysis cyclic phase of research reporting when concepts and theory start to emerge – an '*integrated-in-the-text'* discussion. This type of literature review serves to verify, enrich, clarify and explain new theory development. The literature consulted indicates that some researchers report all reference to the literature in this way and use only this *integrated review* for all literature review-objectives. If reviewed literature is reported in this way, description of theory development in theses may yield lengthy discussions that can be difficult to follow: it often distracts attention from the central thread of logically derived theory.

- *A consolidation review and a interspersed-in-text review*

A seemingly more effective literature review format than the above-mentioned interspersed-in-text-format presents as a *text-integrated literature* review combined with a separate *consolidation* and reflexive literature review. Such an additional section is then continually referenced in the description of the theory development research cycles. This prevents long comparative discussions in the reporting of the cyclical analyses and deflects discussion to the consolidation review. The literature referencing and discussion is not completely removed from the cyclic analysis discussion but only re-routes lengthy discussions to the separate reflexive literature review section. The purpose of a consolidation literature review is not only to accommodate comparative discussions on newly developed theory but also to consolidate, explain and reflect on final theory formulation.

- *An initial introductory literature review and a consolidation or interspersed-with-text review*

A third literature review format in GT research reporting adds an *introductory* literature review to either the *interspersed-in-text* option, or the *consolidation review* option. As indicated in Section 2.4.1.2 the initial/ introductory literature review section was not originally supported by Glaser and Strauss but (Section 2.4.1.4) a movement from a more flexible stance on an early review has altered perceptions on an introductory review. The benefits of an early review have been mentioned and are significant: researchers need to be informed on the status quo of research in their field; researchers need current information to be able to report on what has not been done in a substantive area; researchers have to orientate and position themselves within the research field; they need background knowledge to enable them to enter into the research debate in their specific direction; researchers need evidence to prove that their research contribution will be worthwhile and foster development in the substantive research area; GT practitioners need a baseline to compare and evaluate their research against accepted and tested research; orientation in the research field enables researchers to formulate and refine research questions and hypotheses[35]; academic and ethics committees' approval often requires a literature review in research proposals and ethical clearance; and theoretical sensitivity is strengthened (Bryant 2007:20; Stern 2007:122; Covan 2007:59; Wuest 2007:247; Lempert 2007:20, etc.). These types of early review objectives focus on informing, orientation and motivation and do not focus on an in-depth investigation of existing theory.

[35] The continual refinement of the research question and research topic in GT method is also applied in the study under discussion.

- *A traditional "Chapter 2" literature review written once research has been completed*

A more alternative approach to reporting reviewed literature in theses stems from traditional institutional requirements that require a fixed literature review placed in the initial chapters (first or second chapters) of a doctoral thesis. This approach actually advocates for a consolidation literature review (written once research has been completed) to be placed early (chapter 1 or 2) in the thesis to satisfy institutional/ examination board requirements, and at the same time honour the Glaserian GT requirements of no literature review in the early stages of GY research. This however seldom presents as a feasible option because if a consolidation review is placed early in the text the thesis would 'give away' the research story and pre-empt research still to be described in the remaining chapters of the research write-up. This would create an awkward situation of continuously motivating the placement of the literature review.

2.5.3 The choice of the literature review format for this research

This study under discussion opts for an introductory literature review (similar to the 'scanty' review described by Charmaz and the scoping review described by Elliot) and an interspersed-in-text literature review. This combination addresses the specific needs of the researcher and the academic body:

- The introductory review will (i) provide a rationale for the research and inform on previous research approaches (Munhall 2007:247; McGhee et al., 2007; Coyne & Cowley, 2006), (ii) assist in assessing the status quo of research in the field (Munhall 2007:247); identify knowledge gaps to serve as motivation for a study; prevent duplication of research (Chiovitti & Piran, 2003; Creswell, 2009); (iii) contextualise the study (McCann & Clark, 2003a); inform the researcher on the substantive area (Urquhart, 2007:351); (iv) sharpen the researcher's awareness and discriminatory ability (McGhee et al., 2007; Strauss & Corbin, 1998); inform on potential methodological pitfalls (McGhee et al., 2007) and potential predispositions (Maijala, Paavilainen, & Astedt-Kurki, 2003); and (v) advance structured thought processes (Henwood & Pidgeon, 2006, p. 350). In conjunction:
- The interspersed-in-text review allows the researcher to use literature as a secondary data source and as a sensitising 'tool' towards clarification and recognition of conceptualisations, categorisation, identifier of relations between concepts and categories, theory development and theoretical code in data. Wuest (2007:247) expresses the value of the literature:

  ..... [during constant comparison] concepts in existing theory are identified as fitting with concepts specified from the data. In this case, the researcher may decide to adopt the existing theoretical concept through the constant comparative process of emergent fit ....

This approach appears to best suit the research context of the study of *research output proficiency* and *factors that affect research output production*. Section 2.6 which follow presents an overview of literature examined to orientate the research, determine the status quo of research and motivate the knowledge gap on research output productivity as perceived from the perspective of a statistician in a research support capacity.

2.6 A introductory literature review on research output productivity (ROP)

The essence of the methodology of GT was defined in Section 2.3. This was done to provide background on the methodology before recounting the debate on the timing of literature review/s in GT application (Section 2.4). The literature debate was discussed to motivate this study's choice of an introductory and interspersed-with-text format for the reading and presenting of reviewed literature (Section 2.5).

2.6.1 How the introductory review was executed

The purpose of the initial literature review is to scope a broad spectrum of literature that cover events, issues and factors linked to *producing and publishing academic articles,* where producing research is interpreted as the research process – doing research'. The intent was to identify which specific areas (e.g. the peer review process or researchers' writing skills) have already been linked to producing and publishing research and to determine whether theory has already been developed and discussed in accessed articles. The purpose is not to study the (if available) theory itself but establish if research has already been executed and in which context.

Literature was initially briefly scanned for its relevance to *producing and publishing articles* (and an array of additional key words that would indicate *producing and publishing academic articles,* e.g. *research output; research output* productivity, academic articles and many more). Once articles, books, institutional repositories, the web (via Google Scholar) and other sources had been scanned, a second round of review of the identified literature – that looked promising - was undertaken. In the second review attention was paid to:

- Becoming acquainted with the broader field of *producing and publishing research*
- Clarifying the research topic of the study (e.g. would the term *research output proficiency;* or *research output publication;* or *research output productivity;* or *academic output publication* or *academic article publication;* or *research publication* (and various other combinations) best described the topic of the study?)
- Identifying events, circumstances, factors, conditions, processes that have been linked to producing and publishing research articles
- Establishing whether previous research investigated single factors or events that influence the publication of research; or whether combinations and groups of factors or events were considered for their effect on article publication
- Investigating the context in which previous research has been conducted
- Investigating whether theory has been developed on the production and publication of academic research, and in which context the research was conducted (identify such theory not study the theory itself)
- Establishing whether research on publication/production of academic research had been undertaken from the vantage point of a research support statistician/or statistical community that supports researching academics, and,
- Specifically note whether the research process is linked to the production or writing of research articles.

Armed with information on the above issues, the researcher would then be in a position to motivate a knowledge gap in the research area, clarify and formulate a research topic and formulate a provisional research question for the research. Clarity on the research topic would also be narrow down the substantive research field.

Tables 2.1 and 2.2 in Appendix 2 (of this chapter) illustrate how accessed literature was managed to keep track of key aspects and issues and guide decisions on whether specific references should be further reviewed.
These tables list typical examples of keyword searches, topics discussed and which articles were referenced. The table does not include all reviewed literature references of this initial review – a total of 193 articles were accessed. The table includes instances of poor and promising hits that were followed up and reviewed against the criteria bulleted above or ignored in further reading.

2.6.2 How did this initial literature review inform the study?

An important aspect of the initial review was to become familiar with the substantive area and in the process clarify and formulate the research topic of the study: The topic should be named to accurately describe the crux of the research: how the chances of effectively publishing research findings are influenced by factors linked to the research environment of the researcher and the research process that underlies the generation of research findings – -from the planning phase of research through to data collection, analysis, interpretation and write-up of research findings, to the submission phase of a research article. How should the phenomenon be named; r*esearch output productivity, research output delivery; research output proficiency; research output publication, research publication; academic article publication*?

2.6.2.1 Clarification of the research topic: research output productivity (ROP)

Productivity implies that something is produced and is defined as actions that cause or create tangible results when industrial, artistic or literacy labour is executed (Harper Collins 1997). Research output productivity therefore describes the tangible results of actions of scientific research labour as research output productivity. The number of *research output productivity* hits and the relevance of referenced literature when *research output productivity* was used as search-key in web searches served as a strong indication that *research output productivity, or alternatively research productivity* delivered results that pertain to events, circumstances, processes, the research process and factors that affect the production and publication of research findings (e.g. works by Aksnes 2012; UK BIS Department of Business, Innovation and Skills, 2011:63; Bland, Center, Finstad, Risbey and Staples 2005:225; Kern 2011:949; Hancock, Lane, Ray and Glennon 1992:26-38;Plume 2011; Sulo, Kendagor, Kosgei, Tuitoek and Chelangat 2012:475; Levin and Stephan 1991:114; Charbonneau 2011; Rodgers and Neri 2007:67; Balakrishnan 2012, amongst others, attest to this).

In contrast to the number of successful hits obtained with the *research output productivity*-keyword, web-searches containing the keywords, *research [output] publication; publishing research output; article publication, academic publishing* or *published research* mostly resulted in hits that covered issues directly linked to publishing, publishing requirements, journal notes-to-authors, editorial comments, editor's columns and the like (e.g. Crane 1976:195-201; Shin and Cummings 2010; Ellison 2000). This tendency in the search-hits guided follow-up searches to focus on phrases that include *research output productivity and research output* rather than *article publication*, or

published research or *academic publishing.* This simple example illustrates how initial search trends assisted in delimiting the research area and research topic formulation. Although publishing issues were also anticipated to impact on the publication (and production) of research articles, the realisation grew that incorporation of the term '*publication/ or publishing'* in the topic label might steer research towards the publishing side of research articles and divert attention from the production and thus the research process component of producing research to publish. The interest lay with grassroots processes and events that had an impact on eventual publication of research output. Furthermore, since a component of the context of the study was the experience of a research support statistician/ statistical community within the research environment of the research – which includes the research process – -the focus of research should not be publishing.

Likewise, literature reviewed on web search-phrases containing *research output proficiency* - which initially seemed to describe the research area of the proposed study fairly well – proved to be a limiting topic label. The word *"proficiency*" describes the ability or skill to do something. However, having the skill to produce research output does not necessarily mean that the skill is put to use or productively applied. In this instance *research output proficiency* is again anticipated to affect *research output productivity* and as such is regarded as a probable dimension but not the central focus of the planned research. Reviewed literature on r*esearch [output] delivery* key-word phrases furthermore revealed that *output delivery* did imply completed and published research findings but did not necessarily focus on doing so effectively (as Smyth and Mishra 2013; Banerjee 2013 view productivity). This again strengthened the conviction that *research [output] productivity* would most comprehensively describe the intended field of research.

With this knowledge available from the introductory research the research topic was thus formulated as

Research output productivity

The research topic assisted in demarcating the research field, but, at the same time brought awareness that the research field was very comprehensive and would have to be narrowed down as reviewing of literature and research progressed.
and would have to be narrowed down as reviewing of literature and research progressed.

2.6.2.2 ROP factors, cluster of factors, research perspective and knowledge gap

The introductory literature review also paid attention to events, factors, conditions and issues mentioned in literature that reports on the production and publication of research findings. Did existing literature report on standalone factors or issues that advance or hinder effective research (production) and the publication of findings? Or did subsets or groups of factors (group factors) or events underlie the effective production of research findings and publication of articles? Answers to these questions would inform on the status of research previously conducted in the field of *research output productivity (ROP).*

Table 2.3, Appendix 2.3 (of this chapter) as well as the reference list for this study include references to numerous examples of standalone factors or events that have been investigated for their effect on ROP. References for example indicate that the following factors/ events / attributes impact ROP: English proficiency (Vasconcelos, Sorenson and Leta 2009); journal editors' influence (Crane 1976); peer reviewers (Publishing Research Consortium 2008); publishing standards (Ellison 2000); positive

research results that get published more readily (Fanelli 2010); grant funding (Jacob and Lefgren 2011);); incentives (Tongai 2013); entrepreneurs (Lowe and Gonzales-Brambalia 2007); inventions and patents (rather than write-up of research findings) (Van Looy, Callaert and Debackere 2006); human capital investment (Rodgers and Neri 2007); appointment type (Bland, Center, Finstad, Risbey and Staples 2006); faculty attitude (Monroe 2011); academics' seniority (Smyth and Mishra 2014; 2013); research/ teaching workload ratio (Ramsden and Moses 1992); international exposure (Plume 2011); life-cycle of academics (Levin and Stephan 1992); attributes of perfectionism (Charbonneau 2011); numeracy skills of researchers (Gibbs 2010); mentoring (Cohen, Sherman, Kiet, Kapp, Osann, Chen, O'Sullivan and Chan 2012); academic consulting (Perkmann and Walsh 2009); collaboration (Lee and Bozeman 2005; Abramo, D'Angelo and Costa 2009; Carillo, Paganini, Sapio 2011); research resource centres (Mji and Glencross 2002); quantitative methodology proficiency (Hanson, Hull and Williams 2010); statistical literacy (Williams, Hodgkinson and Payne 2005); statistical thinking (Dansfield, Fisher and Vogel 1999); statistics (Webster 2001; Reston 2007); and statistical support (Omar, McNally, Amber and Pollock 2006; Ponomariov and Boardman 2010; University California's Statistical Computing Centre 2013).

On closer inspection all of the cited standalone or single factors or events mentioned seem to group under more comprehensive factors or events or concepts. Examples of group factors would be the *publishing process* (editor, peer reviewers, guidelines and policy); *faculty environment* (attitude, appointment type, seniority, life cycle, research/ teaching workload ratio), *institutional environment* (human capital investment); *funding* (incentives, entrepreneurs, inventions and patents, human capital investments), *researcher development aspects* (mentoring, collaboration, international exposure, training), *researcher attributes and skills* (English proficiency, numeracy, statistical thinking, perfectionism) and *research support* (academic support, statistical support, research resource centres).

The suggestion of more comprehensive/ inclusive factors or events is verified in various studies in the literature. For example Shin and Cummings (2010) refer to comprehensive factors that include sets of standalone factors/ events: *Faculty effect* (faculty mission, faculty type, faculty discipline, research time allocation, academic ranking, training); *institutional effect* (institutional climate, institutional support, institutional characteristics), *biographical properties* of researchers (age, qualifications, attitude, personal preference, qualifications, workload) and *skills* (research skills) that affect ROP.

Likewise, Bland, Center, Finstad, Risbey and Stapels (2006) refer to influential ROP comprehensive/ inclusive factors of a *supportive research environment* (decentralised organisation, recruitment of research driven staff, culture of research, positive group culture, mentoring, communication, resources, time allocation, rewards, professional development); *faculty member characteristics* (motivated, skilled, knowledgeable, internally and externally orientated, scholarly working habits); and *faculty leadership qualities* (regarded scholar, research orientated, assertive-participative leadership style, initiates structures to monitor and support research).

Other examples of comprehensive factors or events include the paper by Ryan and Hurley (2007). They list six components of the *research environment* group factor that impact on research performance, namely morale, information flow, involvement, supervision, teamwork and meetings.

Bland and Ruffin (1992) refer to a *research productive environment* comprehensive factor with elements identified as clear goals, research emphasis and culture, effective recruitment, assertive-participative governance, researcher group-size, decentralised organisational structure, reward system, communication and team culture, adequate resources and good leadership. Jung (2012) defines overarching group factors which include *demographics (*gender, years' experience); *workload (*time allocated to research, time allocated to teaching); *research style (preference for* research, collaboration, applied research) and *institutional characteristics* (performance-based management, commercial orientation, shared governance). White, James, Burke, and Allen (2012) define an *attributes-of-researchers* comprehensive factor that impacts on ROP with elements of contentiousness; researchers' regard for research; their time management skills; their career promotion history; research support available to them; assistance of doctoral students; allotted research time; teaching responsibilities; and whether they are situated at a high research impact faculty.

A comprehensive r*esearcher characteristics/ or biographic profile* factor *(*studied in a medical context) is defined by Alghaniam and Alhamali (2011) in terms of gender, age, years of professional experience, academic rank, administrative workload, post-grad supervisory responsibilities and research training received in the previous two-year period. The comprehensive factor was investigated from a medical researcher's vantage point.

The examples in the above discussion indicate that factors and events that impact on ROP have been researched in independent studies, but that the emphasis appears to fall on the final research output product: the productivity aspect of research output delivery, and on predicting and increasing productivity: almost from a financial gains-and-loss perspective or faculty management perspective, but not from grassroots level in the researcher's environment. Existing literature extensively covers altmetrics (Sugimoto 2015) - ways in which research can be measured, universal output criteria standardised and output compared against global norms. Numerous studies on research units earned for published output and financial gain are reported (Please refer Section 1.2.2.2 in Chapter 1). The literature furthermore indicates that research output and output productivity have been studied from different vantage points, e.g. medical, nursing, education. Sources could not be found that report on a grassroots or operational research process perspective: how the research is actually executed: planning, collecting and analysing data, interpreting the findings, research write-up and submission of articles for publication – and how the process can be done more efficiently. A grass roots approach to research output delivery seems to be absent. In addition how the statistical community that supports research perceive impacting effects on producing and publishing research is seldom mentioned.

In summary

The introductory review therefore suggest that although research on aspects of research output and research output productivity have been undertaken, a knowledge gap exists as to what affects the research process that produces research findings to be published: without research findings the researcher cannot publish. In the researcher environment the research process directly impacts on ROP. The research process, as a grass roots element of producing research findings, lends a novel angle to the current research. The literature has indicated that research on the link between ROP and how research is actually executed is very limited. One reference by Jordan, Streit and Matiasek

(2003), for example, mentions "*the process of doing research*", but then moves on to discuss literature on the research environment (also crucial to ROP) and does not include the impact of the research process on ROP. Literature on the process of doing research *per se* is readily available but not on how it impacts ROP. The review furthermore revealed that as far as the web searches and literature review covering the research output field were concerned, very little research on the experiences of the statistical community that support researchers in the research environment has been reported. This further describes the knowledge gap in the substantive area this study intends discussing.

The applicability of a GT approach in the study under discussion was also considered while reviewing the literature. The review investigated whether theory on ROP has previously been developed in the area of interest of this research, the reason being that justification for the use of the GT methodology in this study was the theory developing capacity of the method. If theory on ROP had already been developed, the GT approach to the study would not be justifiable. The next section looks into this issue.

2.6.2.3 Literature on relationships between factors and reference to ROP models

As mentioned, the literature reveals that investigations into *research output delivery and productivity* have been undertaken from different (i) vantage points, for different (ii)reasons (calculate citation indices, compare universities against research universities of excellence, rank universities against top research performance, inform faculty on research environments that stimulate research, etc.), and in different (iii) disciplines (medicine, social sciences, nursing, information technology, finance, management and the like). Of significance in this introductory review is that literature indicates that (iv) combinations of factors jointly impact research output productivity - which implies that links, relationships and interactions form part of the research findings. These links and relationships in turn suggest structure and the possibility to develop theory on ROP Literature reviewed was therefore also scanned for theory development on *research output delivery or productivity* and related matters, and is briefly reported on below (the purpose being to determine whether theory exists and not to study the details of such theory if it is reported in the literature):

- Studies that specifically report on *research output productivity* models are not frequently reported in literature. Examples include a study by Kern (2011) who integrates the effect of funding; investigator/researcher quality; passion; analytic accuracy; the research mix of novelty, incremental advancement and confirmatory studies; and efficiency of the research environment into a multiplicative-effect ROP model. Kern is stationed at the Oncology Department of the Johns Hopkins University in Baltimore, USA and suggests a model to optimise research productivity (measured production efficiency) driven by the fact that financial support for research is limited (2011:949). Research was conducted from a financial perspective with the focus on optimising money spent and the acquisition of more funding. Research productivity in itself is regarded as a positive spinoff. The research did not cover the operational process of how research is done, in other words the research process itself.
- Bland, Center, Finstad, Risbey and Staples (2006) report on a validation study of a model developed in 2002 (Bland, Seaquist, Pacala, Center, & Finstad, Bland 2002:368-376) on faculty *research output productivity*. The comprehensive factors of this model explain the impact of the

dynamic interplay of individual-, institutional and leadership characteristics (2005:227) on ROP. The research was conducted at the University of Minnesota Medical School, Twin Cities, USA, and the purpose of the research was to predict and improve research productivity based on respondent perceptions. The study focused on model validation and measuring and improving faculty productivity figures. In the study, the only reference to the operational process of doing actual research was an indicator (one of eight other indicators) on the *individual characteristics* comprehensive factor that questioned research skills, and one (of fifteen other indicators) on the i*nstitutional characteristic* comprehensive factor that questioned professional communication and knowledge exchange (2005:228). Although it is anticipated that researcher-, faculty- and leadership characteristics might impact ROP in the study under discussion, the focus of the comprehensive/ or inclusive factor in the Bland et al study differs considerably from the substantive field of the study under discussion. It is probable that elements of the Bland et al study might emerge in the planned GT research, but probably as part of concepts focused on improving research output from a research process-and research support perspective.

- The research by Drennan, Politis, Hyde and Clark (2012) on a ROP model applicable to Ireland's HEIs was motivated by the lack of research in HEIs in Ireland. Drennan et al. (2012) propose a relational model of *demographic-*, *individual academic-* and *institutional variables* (group factors) that impact on ROP. Their research is ongoing and an anticipated predictive, linear regression ROP model with explanatory variables that include tenured position; preference for research or tutoring; peer reviewing responsibilities; scientific committee services; and service on editorial boards, is being refined. These properties reside under the *individual academic* group factor which they investigate for its suitability to the Ireland situation. For this particular study the research indicates that the effects of *demographic* and *institutional* comprehensive factors are excluded as impacting ROP in the Ireland situation.

Apart from the fact that the focus and perspective of both the studies of Drennan et al. and Bland et al. differ considerably from the context and vantage point of the study under discussion,[36] both studies used a deductive-to-inductive research methodology which differs from the inductive-towards-deductive theory development approach that is envisioned in the GT research of the study under discussion. The argument and literature examples serve to illustrate that existing (fully developed) theory on ROP seems to be very limited and focused on research areas that differ from the vantage point that the current research intends to investigate.

The literature thus indicates that a knowledge gap exists in ROP theory when the effect of the research process is taken into account to produce the research findings and the phenomenon is observed and experienced from the perspective of research support statisticians.

Comment

Not all the literature that has been reviewed up to this stage is referenced and reported in this introductory literature review. Literature cited in the above section gives a fair representation of the status of existing research on ROP and factors and events are identified that impact on *research output production and productivity*. Since a grounded theory approach will be followed in the

[36] The Bland et al. (2005) study is interested in ROP from a financial medical-management position, and the Drennan et al. study from a general research perspective

research, it is argued that some of the literature initially captured (and still to be reviewed, or reviewed but not included in this introductory review) may probably, if appropriate, serve as commencement data source in the initial cycles of analysis and constant comparison phase. The purpose would be to identify emerging concepts, categories and relationship.

2.7 Conclusion

This chapter, on the introductory literature review of *research output productivity*, started off by motivating the essential role, benefits and enrichment that literature bring to a research study (Section 2.1).

The discussion then deviated from the conventional reporting of the literature of a research topic by presenting initially a brief review of the literature on grounded theory methodology (Section 2.3). The reason for this deviation was motivated by the fact that initial investigation and consideration of the study of research production and article publication indicate that a grounded theory approach is ideally suited to this particular research setup because limited theory development has been undertaken on ROP at least from the perspective of this research. GT methodology is ideally suited for circumstances where limited research has been undertaken.

The argument line of Chapter 2 continued by providing a brief overview of the literature on GT methodology and did this by introducing the method of GT and indicating to basic assumptions of the methodology. These include, inter alia, an open-minded approach to the research topic (in this instance ROP). This assumption has implications for how and when literature is reviewed: reviewing literature (the knowledge obtained in this way) should not hinder and bias sensitivity for emerging theory and theoretical concepts from collected data. How, when, and the format of the literature review in GT studies therefore had to be addressed prior to execution of an introductory review. This ensures that the quality of research to be conducted will not be compromised at the onset of the research.

Therefore, prior to presenting a review on ROP (discussed in Section 2.6 of this chapter) and in contrast to more conventional research, a literature review was (firstly) conducted on the timing and extent of literature reviews in GT implementation. This was done to fathom how the various developers of GT methodology perceive the ways in which literature should be managed; how reviewing the literature should be timed; to what extent literature should be reviewed; and suggestions of the type of reviews/s that should be conducted in GT research. In the review presented on this matter (Section 2.4) the experiences and views of not only the developer of GT were presented, but also that of doctoral students who implemented GTM in their research. The findings of this review indicate that a more relaxed stance on the review of literature in GT research (especially in the initial cycles of research) has evolved over the almost six decades since the inception of GT methodology and the implementation thereof. Reasons were found to be numerous and include for example the argument that an initial review can focus on events of interest to the research topic without concentrating on existing theory description in the literature (in other words the format and/ or extent of such a review); as well as acknowledgement that researchers bring – aside from knowledge gained from reviewing literature - existing knowledge into any research

endeavour. Existing knowledge cannot be undone or ignored and can also influence researchers' perceptions of theory emergence or development. The possible introduction of bias into theory development or emergence should rather be counteracted by creating awareness that existing knowledge can influence researchers' perceptions of theory emergence. Furthermore, by limiting the extent of a review (especially in initial analysis cycles) to events/ or facts/ or incidences and steering away from theory description can limit the effect of bias.

The discussion of the timing of a literature review/s was concluded by stating this study's stance on reviewing the literature. Section 2.5 indicates that this research chose to restrict the content of an introductory review of ROP to literature that relates to events and incidents that other studies found to affect the production and publication of research findings (as published articles). Literature on existing ROP theory would not be reviewed in any depth. (However, a literature-search for articles reporting on theory of research output found that they were very limited). This research indicates that an introductory literature review would be conducted and reported on in the initial phase of the research and that reference to additionally reviewed literature would be made throughout analysis cycles as and where interim analysis findings so required (to verify or/ and enrich continued theory development). This research therefore includes an introductory literature review and an additional review, labelled as 'interspersed-with-text' review.

The introductory literature review on research production and research publication reported in Section 2.6 describes how the literature was searched; how topics and incidents that relate to ROP were structured and organised; how a knowledge gap could be verified to justify this research; how the research topic could be clarified; and how the first components of a theory on ROP were suggested by the literature review. This serves as a promising lead that GT method will be an appropriate approach to this study.

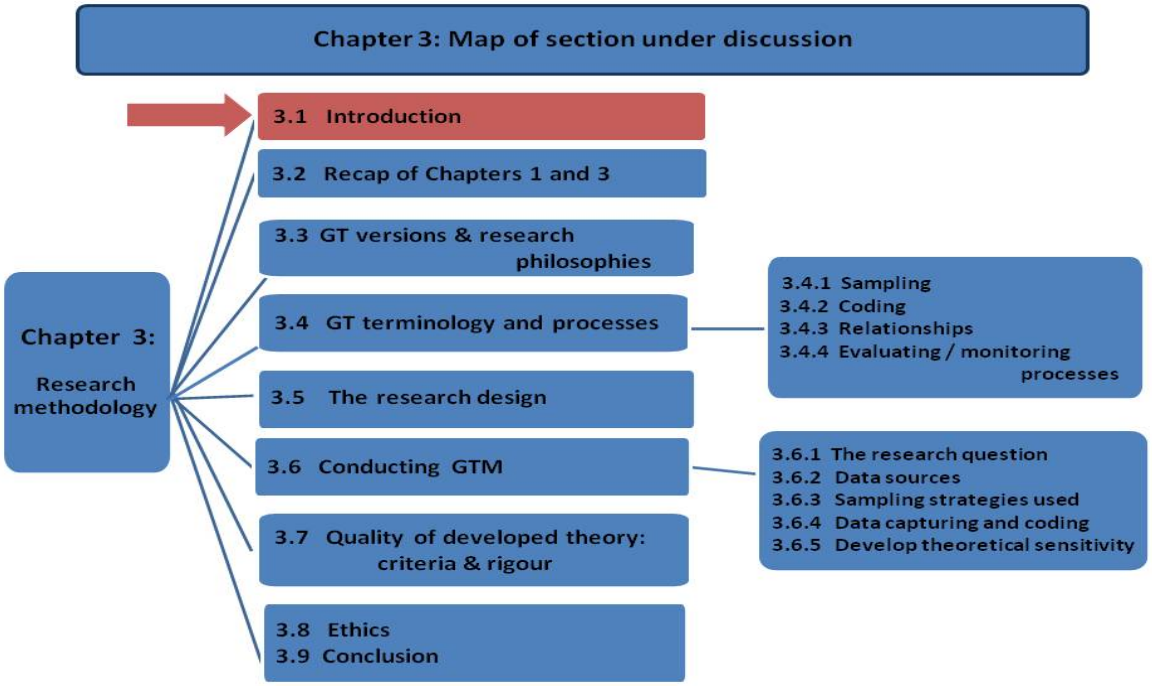
Chapter 2 served to clarify the uncertainty around reviewing literature in GT research and in doing so paves the way to address the next issue of concern, namely gaining more understanding and insight into the different versions of GT methodology and deciding which approach will be best suited for the context of this research. This aspect is addressed in Chapter 3 that follows.

(The appendix to Chapter 2 is included in the General Appendices at the end of thesis)

Chapter 3

Research methodology

3.1 Introduction



This chapter describes the GT methodology that underlies the study of *research output productivity*. Up to this point the discussion has motivated (Chapter 1, Section 1.2) and clarified (Chapter 2, Section 2.6.2.1) *research output productivity (ROP)* as a research topic and has provided a brief background description of the method of GT to back the choice of GTM as appropriate research methodology for the study. The background description served to explain the literature debate on the timing of a literature review/s in GT studies and to state the view this study takes on reviewing literature in GT research (Chapter 2, Section 2.5). The introductory literature review that followed indicated *research output productivity* as a knowledge gap[37] and that limited theory development on ROP had been conducted in the area of interest to this research.

To recap on the argument line up to this point, Chapter 1 sketched the context of this study (Section 1.3) and motivated the importance of the timely availability of new research knowledge for decision making and policy formulation in all facets of a community (Section 1.2). Apart from much-needed knowledge generation, article publication-rate also affects government grants to South African HEIs. This adds another dimension to the quest for published articles, the crux of the argument being that effective production of academic research output is, and will continue to be, critical in the higher education research environment.

Chapter 2, in the introductory literature review (Section 2.5), motivated a knowledge gap. Limited theory-development on *research output productivity* (ROP) has been undertaken, and especially so from the vantage point this study anticipates doing, namely a grassroots approach – factors that

[37] From the vantage point this research intends investigating research output productivity.

impact conducting research (the research process) – and that produce the research findings required to submit articles for publication. The research will be approached from the vantage point of a research support statistician in the research process – a novel research perspective. Chapter 2 discussed the essence of GT methodology (Section 2.3) to explain the theory-developing capabilities of GT that makes the methodology suitable for this research (Wuest 2007:244).

Set against this background, Chapter 3 elaborates on the details of GT methodology, process, research design, research strategy, ethics and quality. The chapter is structured as follows:

- A recap of the provisional research question and objectives of the study (Section 3.2);
- GTM definition (Section 3.3.1) and terminology (Section 3.3.2): substantive area, sampling units, data incident, data sources, research participants, theoretical sensitivity, theoretical saturation (Section 3.3.2.1 – 3.3.2.5);
- Principles of GTM processes (Section 3.3.2): theoretical sampling, constant comparison method, coding, memoing[38] and sorting (Sections 3.3.2.6 to 3.3.2.10)
- The research design of this study (Section 3.4)
- Implementing the methodology in this study (Section 3.5): research topic, data sources, research commencement, research participants, theoretical sampling, research instruments, GTM analysis, building theoretical sensitivity, rationale for research discussions in Chapters 4 and 5, (Sections 3.5.1 to 3.5.7)
- Quality criteria for developed theory and research ethics (Sections 3.6 and 3.7)
- Limitations and conclusions (Section 3.8 and 3.9).

Comments

- During research write-up the need was felt to convey additional information to the reader of this thesis. The decision was taken to communicate such information by means of comments inserted where deemed relevant. The next explanation on the non-time-linear presentation style of research reporting serves as the first instance of additional relevant information.
- Because of the theory-generating nature of GT methodology, GTM follows an *inductive-towards-deductive* research approach. This is different from more conventional *inductive-towards-deductive* research approaches that facilitate the verification and/or testing of existing theory. Deductive-towards-inductive approaches strive to validate or improve existing theory whereas the GTM *inductive-towards-deductive* approach is primarily concerned with understanding a particular phenomenon and explaining it by means of theory development. This implies that a GTM study does not start off with a theoretical framework in the introductory sections of research write-up since the theory in the (un-investigated) substantive area still has to be developed.

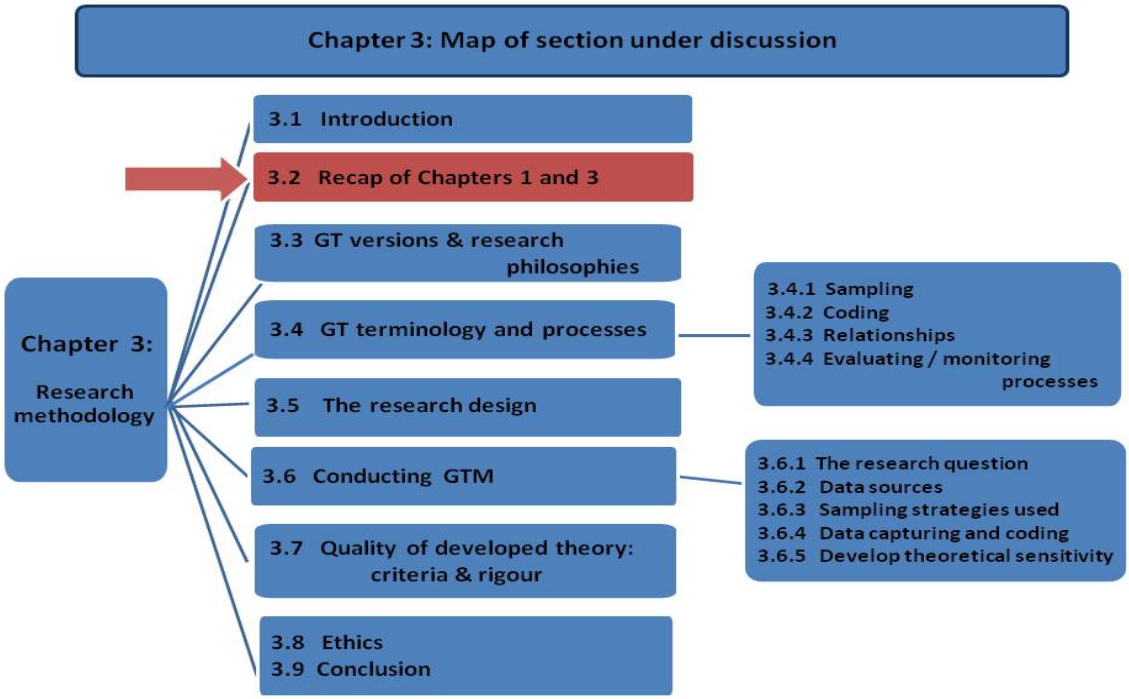
  As briefly indicated in Chapter 2 section 2.3.1 the nature of GTM consists of cycles of data collection, analysis and comparison to advance theory development. The very nature of this process implies that research execution and research write-up do not follow a linear pattern of events as do more conventional research methodologies. The cyclic process of interactive data-collection, analysis and comparison steps - where execution of later steps is dependent on results

[38] The literature refers to the writing of memos as 'memoing' (Charmaz 2012; Lempert 2007:248). Memoing could also be written as 'memo-ing'. This study prefers 'memoing'.

of prior steps – causes research execution and write-up to progress in a non-linear time sequence. The non-linear time frame is mentioned at this stage because it affects the presentation sequence of research in a GT thesis compared with research presentation in a conventional research thesis.

Instances of the non-linear presentation format reflect in the discussion of the research paradigm of the study (Chapter 1, Section 1.5). A theoretical framework was not presented as part of the research paradigm since an existing theory is not available when research commences and has still to be developed. The format of the literature reviews – both the introductory review and the review interspersed-with-text - serves as another example of the non-time-linear reporting style of GT studies (Chapter 2, Section 2.5.3). This comment serves to sensitise the reader to subsequent instances of a non-time-linear presentation of research reporting.

3.2 A recap on the research topic and the research question



The research topic

As background to the methodology discussion of this chapter a brief review of the research topic and question is presented (Nenty 2001; 2009). In Chapter 2, Section 2.6.2.1 the argument was made out that *research output productivity* best describes the phenomenon of effectively producing quality research in the form of published academic articles in accredited journals (Section 1.3.3.2), within the open and distance (ODL) higher education environment (Section 1.3.4.1) of South Africa. It was indicated that the term, *research output productivity,* embraces the aspects of *research output delivery; research output proficiency and academic publishing* that present as possible alternative but more restrictive labels for the research topic.

Vantage point of the research

Of central concern to this study is the fact that successful delivery of research output (published articles) depends on the research process that produces research (Flanagan 2005; Munhall 2007:249-262; Hoda et al 2011: 609-639; Allan 2003; Parry 1998). If the research process does not proceed scientifically research findings and publication are compromised. This study will therefore be structured around the research process and its dynamics – whether dynamics be factors *within* the research process (for example, aspects such as researcher attributes; the type of research methodology; research support rendered) or factors *external to* the research process (such as institutional or environmental issues) or a combination of both. This approach serves as initial demarcation of the research field.

The research is furthermore narrowed down by the vantage point of the researcher: the dynamics of the research process that underlie ROP is evaluated from the perspective of a research support statistician in the research process. In this way the voice of the statistical community that provides support in research endeavours are brought into the investigation.

The research topic and research question formulation continually evolve in GT research

With reference to the comment on the unique format of research reporting in GT studies in Section 3.1, Wuest (2007:245-255) comments that the very nature of GT methodology impacts on research topic- and research question formulation: as research progresses and the core category of the substantive field begins to emerge more information on the research topic becomes available. Acquisition of more/ new information results in the formulation of the research topic and research question being continually adjusted. Refinement of the research topic throughout research stands in contrast to that of conventional quantitative or mixed research methodology that starts off with a formal, concise research topic and an already formulated research question that states the (existing) theory assumption or verification which is to be tested in research. Research question formulation in GT methodology is however adjusted as relationships between conceptualisations emerge from interim cyclic data collection and analysis phases. The emerging relations are continually rephrased as (sub)-research questions or propositions (that explain relationships), according to Wuest (2007: 245-255).

As explained in the introduction to this section, the research topic of the study was clarified in Section 2.6.2.1 as *research output productivity*. In Chapter 1, Section 1.6.1 the research question was introduced as:

How do research-related events and processes interact with research output productivity?

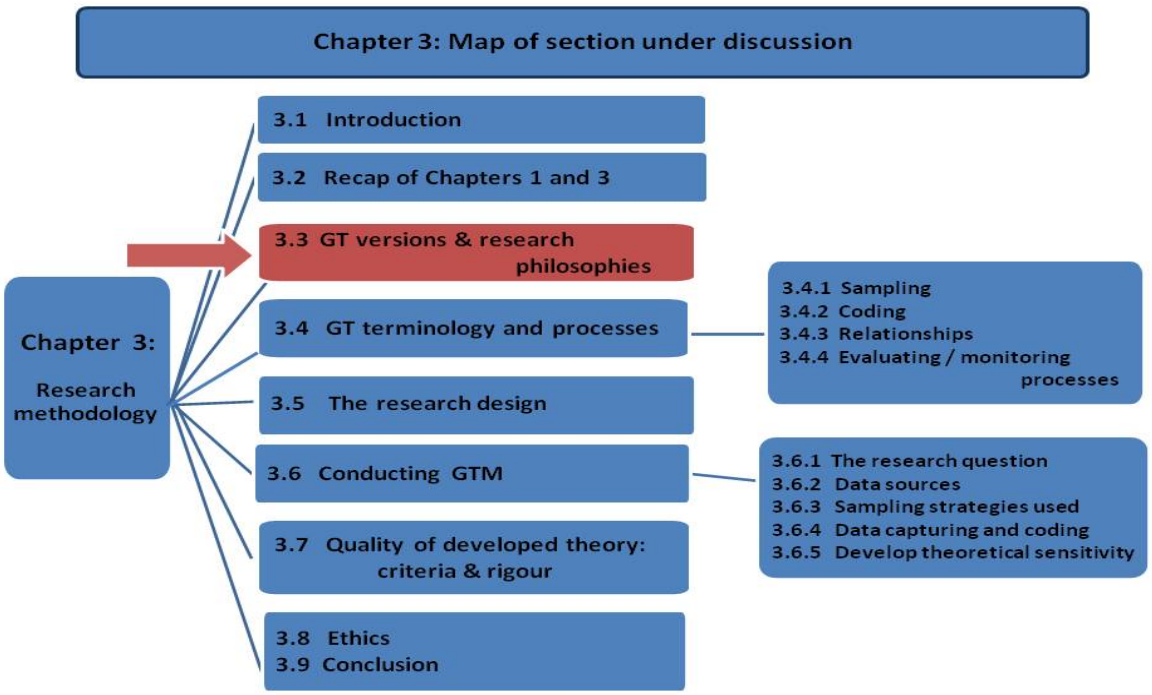
Additional background knowledge gained from the introductory literature review in Chapter 2, Section 2.6 resulted in a more refined version of the research question[39]:

Viewed from the vantage point of a research support statistician in the research process, how do factors and/or events related to and within the research process affect research output productivity?

[39] The question formulation in GTM is continually refined as the core category and relationships between conceptualisations begin to evolve as research progresses (Wuest 2007:245-255).

As indicated in Chapter 1, Section 1.6.2 the research at this stage refrains from proposing propositions. Buff (2005), and Strauss and Corbin (1998) comments that the 'discovery' nature of GT methodology should not be inhibited or redirecting by proposing how theory and relationships should/or might behave/or develop: the data should be allowed to tell the story without presuppositions that cloud an open-minded approach to theory development. For this reason even preliminary propositions are not formulated and included. The discussion now moves on to detailing the elements and terminology of GT method.

3.3 Background on GT methodology: versions and philosophies



The somewhat unorthodox move taken in this thesis to include a brief discussion of the essence of the GT technique in Chapter 2, Section 2.3.1.1 - the literature review chapter - was taken to provide the necessary background on GT to motivate the format of the introductory literature review that was subsequently presented in Chapter 2. The current chapter, Chapter 3, now further discusses GT methodology without returning to the essence of GT. However, to recap on the earlier discussion in Chapter 2, a diagrammatic explanation of the cyclical operational process of GT – as adapted from Creswell 1998 (Figure 2.2 of Fernandez 2004, Chapter 2) – is presented in Figure 3.1.

Figure 3.1: Recap of the cyclical operational process of GT method

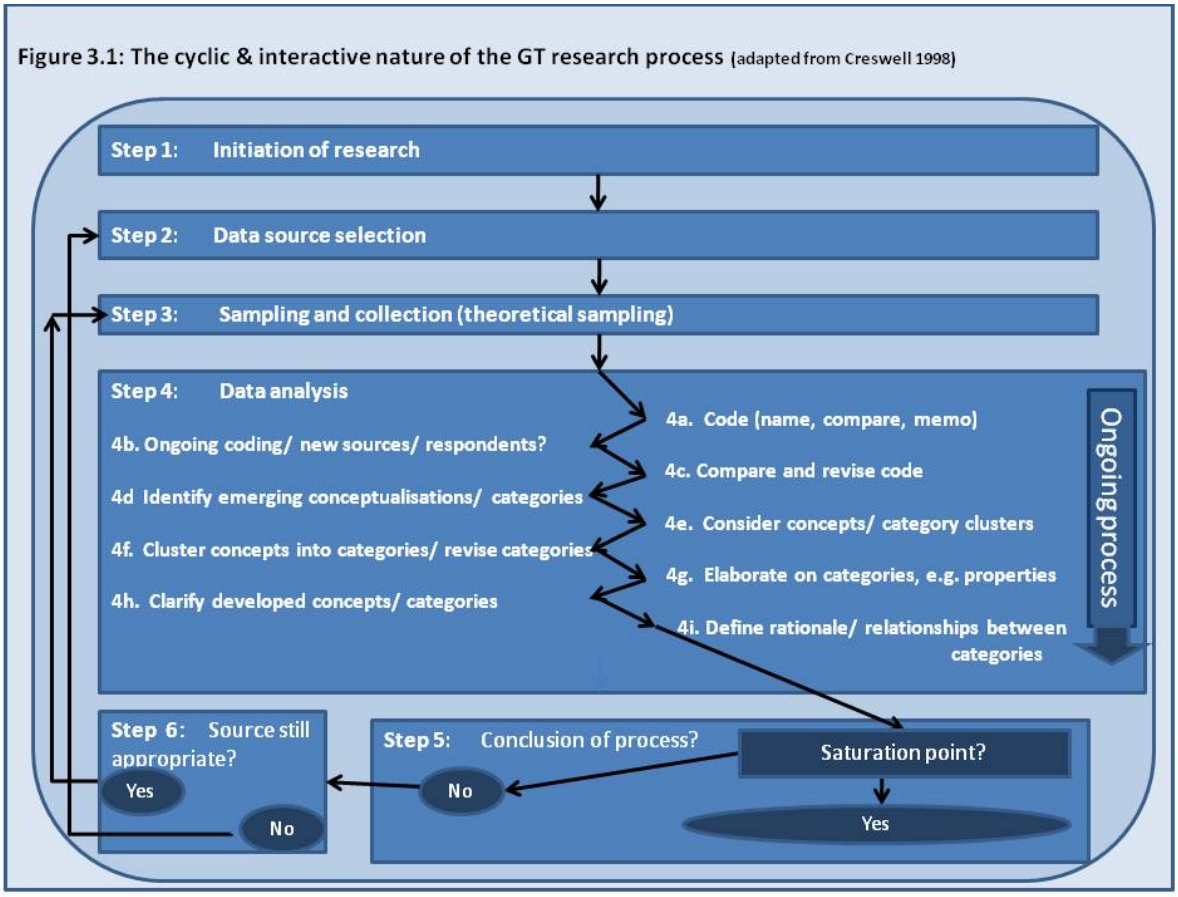


Figure 3.1 offers a generic guide to the application of the GT process. The remainder of Chapter 3 now details GT methodology and will do so by firstly turning attention to troublesome issues of different versions of GT and to different research philosophies associated with these GT versions (Section 3.3.1. and 3.3.2) before detailing the components and terminology of GT methodology (Section 3.4).

Issues of research philosophy and versions of GT that this research has to clarify before moving on to the application of GT method includes the questions:

- Whether different versions of GT have evolved over time;
- If so, whether the different versions basically follow the same generic, cyclical analysis approach, or whether some versions are more flexible/ more mechanistic in their approaches?
- Whether coding terminology of the versions differs;
- Whether data and results are interpreted differently depending on research philosophy of the study;
- Whether different versions are strictly underpinned by specific research philosophies;
- Whether a specific version and research philosophy should be regarded as the 'best' option for any GT research investigation.

In discussing thesis issues, this study explains the choice of classic GT as the version of choice for this study (please refer to Chapter 1, Section 1.5.2) as well as the research philosophy of this study,

namely a constructivist/pragmatist philosophy – based on Crotty's (1998) structuring of research philosophies (Chapter 1, Section 1.5.2).

3.3.1 Versions of GT methodology

Researchers are often confused when confronted with the issue of seemingly different versions of grounded theory suggested in the literature. Questions arise as to whether different versions truly exist; and if so, which version is most appropriate and whether more recent versions of grounded theory should rather be applied (Fendt and Sachs 2008:432, 441). The writings of more recent researchers (Fendt and Sachs 2008:439,447; Bryant and Charmaz 2007a:19; Mills et al. 2006:29; Bryant 2003; Jones and Alony 2011:97) acknowledge that grounded theory method has evolved and that more than one version exists. Literature furthermore indicates that some versions are more flexible while others apply GT method more rigidly or mechanistically. Literature also suggests that earlier philosophical and conceptual foundations and methods become less justifiable as new insight evolves through application to a broader spectrum of subject specific research fields (Tan 2010:95, 108).

Charmaz (2006:10) acknowledges that researchers are influenced by their experience, knowledge and interactions with people and research practice and that this affects the way they reason and execute their grounded theory research. Charmaz, for example, proposes a less objectifying approach because of her philosophical stance that reality is experienced differently by each individual and solutions to problems are therefore multi-faceted. Charmaz acknowledges pragmatic principles but also advocates constructivist reasoning which lends a more fluid and open-ended approach to GTM – as opposed to the more pragmatic grounded theory version of Strauss (Charmaz 2006:184). The Charmaz version is referred to as constructivist GT.

Tan (2010:108) compares the Charmaz version against founding GT versions and comments that (i) Glaser's approach allows creativity but runs the risk of loss of "coherence and focus". Tan links this to the fact that Glaser (and initially Strauss), who originally developed GT, followed a more objectivist approach to research and this gave rise to the GT version currently referred to as the classic grounded theory version (the next paragraph will indicate that Glaser actually reasoned that his approach was free of a research philosophy). In his comparison of GT versions, Tan furthermore remarks that the Strauss and Corbin version tends to be "formulistic and inflexible" (Tan 2010:108): this version is referred to as the Straussian version and as mentioned is associated with a pragmatic approach to research. These references indicate that grounded theory is still evolving: Charmaz's stance has moved away from the older Glaserian school that advocated emerging theory should be as objective as possible and that data should remain separate from the scientific observer (Charmaz 2006:10 and Glaser 2002).

Various researchers and theorists have studied the evolution of the GT methodology and the resulting GT versions (Heath and Cowley 2004; Parker and Roffey 1997; Walker and Myrick 2006:548; Onions 2006; O'Conner et al 2008). The perceptions of 34 grounded theory researchers are reflected in a 2007 book edited by Bryant and Charmaz (2007). The book addresses basic GT principles and versions of GTM. The underlying message of the work is that different versions of GTM can be applied depending on research context, purpose and research philosophy provided that

GT principles are adhered to. Bryant and Charmaz (2007) state in their introduction to the book that researchers should primarily be guided by the core purpose of grounded theory, which is to "… generate core concepts and develop a theoretical framework that specifies their [the concepts'] interrelationships". Literature by Tan (2010:95) and Parker and Roffey (1997:222) advocate the same guidelines.

In another publication, Charmaz (2008:461) appeals to researchers to consider more recent versions of grounded theory that address researchers' needs and embrace their research epistemology, philosophy and research environment (see section on research philosophy which follows). Fendt and Sachs (2008:447) also argue for less stringently applied procedural techniques (more recent versions) that do not inhibit the creativity and sharpness of the researcher and conclude:

> In sum, we consider GTM in its more recent forms a valid and useful method ….and would like to see it applied more than just once in any scholar's lifetime.

A detailed discussion of the differences between the three[40] most prominent versions of GT methodology (Classic, Straussian and Constructivist GT) is not covered in this thesis since such a discussion could become comprehensive and distract the focus from the research question of this study, namely an investigation of the *dynamics of ROP, as experienced by a research support statistician, within the research process*. The investigation of GT methodology in itself should only serve to determine the version of GT most suited for the mentioned purpose. However, an illustrative example of argumentation/research/philosophy differences between classic GT and constructivist GT is listed in Table 3.1 below. Although the constructivist GT version developed by Charmaz initially seemed a very attractive option, this study adopted the classic GT version, because the literature indicate that the constructivist approach leads to multi-facetted solutions (Charmaz 2012:149) and the method of the Straussian GT is often referred to as too mechanistic ("technical procedures", Charmaz 2012:8), over-objectifying theory development (Fendt and Sachs (2008); Fernandez 2012; Evans 2013:38). (Section 3.3.2 to follow further motivates the choice of classic GTM based on context and research-philosophy considerations).

[40] Literature on occasion refers to four GT versions and includes feminist GT as the fourth major school of thought. Straussian GT is also often referred to as QDA: qualitative data analysis (Fernandez 2012; Evans 2013:38).

Table 3.1: A comparative summary of distinguishing characteristics: classic and constructivist GTM

Classic Grounded theory method	Constructivist grounded theory method
To discover latent patterns (of behaviour) within data	Shared researcher-participant rendering, construction of a shared reality (Breckenridge et al 2012) .
How participants' responses are understood & interpreted by the researcher	
*Aims to conceptually explain behaviour (reported by participants) associated with a central concern *Explains patterns of behaviour linked to a central concern *Units of analysis are not the participant but incidents in the data. *Participant perspectives are important and incorporated as a higher order conceptualization: patterns of behaviour explain variation in data. *Ultimate objective: The **conceptual understanding of social behaviour***	*The voice of participant is a central tenet towards portraying participant experience (central concern not a principal issue) * Multiple perspectives/voices portray experience *Unit of analysis is participant experience *Participant's perspectives important and incorporated as descriptive/ interpretive account of participant behaviour. *Ultimate objective: Portrayal of **subjects experience in its fullness** (Charmaz 2003:269)*
Researcher/ participant role in data generation	
*Participant perspective not ignored but treated more objectively towards conceptual theory emergence/ discovery/generation from descriptive detail. Context is 'just another variable' *Researcher perspective not privileged. Just another set of data. Possible bias monitored via constant comparison of personal memoing. Data enables researcher to conceptualise *Purpose of neutral stance to capture essence of participant experience towards meaningful theory generation. Parsimonious description	*Researcher/ participant relation: Data and analysis are co-constructed in inter-action between researcher & participant/s. Data is relative and situational: context important *Development of shared reality. Researcher categorizes. Reflexivity is part of the methodology *Purpose to jointly portray lived experience: interpretive understanding
The concept of relativism	
*Identify & conceptualise one main concern & its continual development *Core category is an "indisputable requirement (Holton 2007:280) *The search for a latent pattern of behaviour in CGT is undertaken to present plausible hypotheses of behaviour, but not to verify facts & findings. The purpose is to identify construct & conceptualization. *Theory adaptable to new information	*Concerned with multiple realities *A core category is not pursued *Delivers more diffuse theory to allow multiple truths - through participants' responses - to be described * Theory adaptable to new information
The effect of philosophical positioning	
A general method not attached to any one theoretical perspective (Breckenridge et al. 2012:5; Holton 2007:269)	*Linked to constructivist philosophy: thus particular "research lens" (Glaser 2002)
Sources: Breckenridge et al 2012; Martin 2006; Charmaz 2003;2008:470 ; Holton 2007; Glaser 2002; 2004	

The investigation of GT versions and the differences between them - indicated in Table 3.1 - suggests that research philosophy also plays an important part in the choice of GT version. In this regard Mills, Bonner and Francis (2006: 26) write that:

> … all variations of grounded theory exist on a methodological spiral and reflect their epistemological underpinning. The form of GT [researchers] follow depends on a clarification of the nature of the relationship between the researcher and participant, and on an explication of the field of what can be known …

This remark signals ontological and epistemological underpinnings and therefore the importance of the combination of GT version and research philosophy. In the research under discussion this triggered the question of whether a specific research philosophy is (strictly) associated with a specific GT version. Comments by Tan (2010:97) and Fendt and Sachs (2008:430) also broach the issue when they indicate that, when adhering to the underlying GT processes and principles, GT methodology is not compromised if different combinations of GT versions and philosophical views are applied. Tan (2010:108) writes that a researcher may use any of the acknowledged GT versions as long as he/she motivates his/her choice concerning version and research philosophy and explains how coding was executed, how ideas and categories emerged, how relationships were derived and resulting theory developed ("canonical" as termed by Fendt and Sachs 2008:430). Motivation should be given because data/ analysis results will be interpreted in different ways by researchers depending on their underlying research philosophy. Murky research should not be disguised as "flexible" or "creative" research methodology. As Suddaby (2006:640) warns, grounded theory is not an excuse for the absence of methodology. These opinions introduce the next discussion on research philosophies and GT methodology.

3.3.2 GT methodology and research philosophies

Urquhart, Lehmann and Myers (2010: 360-361) draw attention to the fact that different philosophical tenets are associated with GT methodology and that uncertainty regarding the combination of GT version and research philosophy is frequently mentioned in the literature (Jones and Alony 2011:98; Hall, Griffiths and McKenna 2013:18). In a 2001 publication, Urquhart (2001:1) poses the question of whether a particular research philosophy exclusively resorts with a particular GT version. Breckenridge, Jones, Elliott and Nicol (2012) comment that there is reason for concern if it is taken into consideration that how researchers apply analysis (e.g. coding) and interpret findings are influenced by perceptions of reality (ontology); the nature of what constitutes knowledge (epistemology); and how knowledge is obtained and processed (methodology) – a particular research paradigm. Madill, Jordan and Shirley (2000:12) also address this concern and argue that a researcher's methodological and epistemological position influences analysis, coding and how GT application - varying from a more stringent to flexible interpretation of method - proceeds. Researchers seek out appropriate methods to ensure rigorous application approaches that do not represent a "pick-and-mix-versions" GT practice (Breckenridge et al 2012; Gynnild 2011:64; Tolhurst 2012). Tan (2010: 95, 96, 108), amongst many others, asks the question how researchers' ontological and epistemological convictions are accommodated in the various versions of grounded theory. This issue is furthermore clouded by the fact that the research philosophy that researchers perceive to be their belief is often misinterpreted by other researchers (Evans 2013: 44-46; Andrews 2012:44; Bryant 2009). Crotty (1998) indicates that meaning and/ or naming conventions of research philosophies also vary.

Uncertainty is also attributed to the original developers of GTM theory method who, some more recent authors claim, did not explicate their philosophical paradigms. Glaser himself admits this shortcoming (1999:836-845) because he regarded GT as free of philosophical underpinnings (which agrees with Bryant's pragmatic stance (2009) for classic GT). To the inexperienced grounded theorist this poses a tremendous challenge: how to choose the method most suited to the particular substantive research focus and context, and how to do so correctly and sensibly. Urquhart (2001:17)

recommends that researchers review the literature and understand the full body of grounded theory before deciding on a grounded theory approach rather than zooming in on one particular approach and blindly adhering to a single approach without insight into other thought directions in the GT arena. The researcher of this study followed this advice and investigated classic- constructivist- and Straussian GT methodology.

Fortunately a golden thread of common-sense guidance on applicability of GT theory method and philosophical paradigm can be traced in the literature. Some works indicate that grounded theory method – as originally developed by Glaser (and Glaser and Strauss) - is inherently a method free of ontological and epistemological underpinnings; thus "paradigmatically neutral" (Holton 2007:269; Breckenridge et al. 2012; Urquhart et al. 2010:361; 2001:17). Glaser himself advocated that grounded theory method is "neutral" (Glaser 1999:836-845) and, according to Urquhart (2001: 16, 17, 19) can be integrated with confidence with several research philosophies – which then refers more specifically to the version now referred to as Classic GT. Urquhart et al however raise the very important issue of interpretation of findings: a researcher's philosophical convictions will affect interpretation and to some extent the analysis/coding procedures of a GT approach/version (Urquhart et al 2010:361). Howell agrees (2013:4) with this statement. This suggests that grounded theory version (developed by researchers with a specific philosophical conviction) and most research philosophies (which might differ from that of the original designer) are, when carefully weighed against purpose of research, type of research question to be answered and research method, interchangeable.

A comparison of GT versions and research paradigms is reflected in Table 3.2 (based on a discussion by Breckenridge et al. 2012 and other authors acknowledged in the table). The table compares epistemological and ontological stance; reasoning pattern; research method and research objective, to guide towards applicable grounded theory method and research philosophy. Classic-, constructivist and Straussian GT versions in combination with positivist, post-positivist, and interpretivist philosophical paradigms are listed.

Literature studied indicates that Glaser's philosophical convictions strongly lean towards post-positivism (Annells (1996), quoted in Birks and Mills 2011:7; Breckenridge et al. 2012; Hall et al. 2013:19; Urquhart 2001:15) and those of Strauss and Corbin exhibit strong constructivist and some post-positivist sentiments (Birks and Mills 2011:7; Hall et al. 2013:19; Breckenridge et al. 2012; Urquhart 2001:16). Other methodological-philosophical combinations of grounded theory work have been reported: for example, Corbin more recently (2009) indicated that although she still abides by the principles of the Straussian grounded theory method, her philosophical convictions have over time evolved "towards a mixture of philosophical orientations" with more emphasis on a constructivist reality approach (Corbin 2009). Other examples of philosophy and GT version-combinations are reported in literature; for example Urquhart (2001:18) reports a Glaserian GT method with a constructivist research philosophy and Annells (1996) a constructivist philosophy coupled with a Straussian GT approach, to name but a few.

Hall et al. (2013:21) comment that GT, from earliest origins in pragmatism and symbolic interactionism to more recent constructivism approaches, offers researcher the opportunity to align their philosophical approach to a grounded theory version that is useful and practical. Glaser

motivates the flexibility of a research philosophy in a specific research context when he (2005: 145) comments on a research situation

> …where grounded theory takes on the mantle for the moment of pre-positivism, positivism, postmodernism, naturalism, realism, etc., depend[ing] on its application to the type of data in a specific research field.

The decision of a GT version can be tied down to Glaser's reference to research context, purpose and research questions:

- The constructivist approach will be appropriate to situations where the type of research question of the study is concerned with multiple interpretations of a social situation (Breckenridge et al. 2012).
- On the other hand classic grounded theory seeks to identify and conceptualise a main concern to which other conceptualised categories link in such a way as to explain a phenomenon (Breckenridge et al. 2012). The end product of research produces an integrated and parsimonious theory: a probable explanation for a social phenomenon that revolves around a main concern (Holton 2007:280). To-be-developed theory and research findings are perceived to be discovered from the data (Mandill et al. 2000). This suggests a 'single solution'/ explanation opposed to the multiple interpretations of the constructivist approach.
- Madill et al. (2000) indicate that a Straussian approach is more appropriate if findings are perceived as constructions of inter-subjective meanings (not emerging from the data, but constructed).

The type of research question to be answered by classic grounded theory methodology therefore differs from research questions suited to a constructivist or Straussian approach. In constructivist GT the research question will concern more than one possible interpretation/ or explanation of a social phenomenon; in classic GT the question will focus in the identification and explanation of a main concern and related concepts; and Straussian GT research questions in turn focus on explanation of a phenomenon based on given constructions.

Table 3.2: Comparative summary of classic, Straussian and constructivists GTM and research paradigms

Philosophy	**Classic GT** (Glaser)	**Straussian** (Strauss & Corbin)	**Charmaz**
Research philosophy	**Philosophy attributed to CGT:** Post-positivism, Hallberg 2006:146 Pragmatism Bryant 2009 **Other philosophies**: ---Urquhart (2001:18) embraces constructivist approach	**Philosophy attributed to CGT:** Post positivism / constructivist (Hallberg 2006:146) Interpretivism (Bryant & Charmaz 2007) More constructivist (Corbin 2009) **Other philosophies**: --- Annells (1996) embraces constructivist philosophy	**Philosophy attributed to CGT:** Symbolic interactionism (Charmaz 2012) Positivism/ post modernism (Hallberg 2006:146)
Ontology	Critical realism (Context just another variable to investigate)	Critical realism: Change, Relativist Multiple perspectives (Context, a variable to investigate?)	Relativism: Multiple social realities exist Context is the focus
Epistemology	Objectivist/ constructivist: Objective Discover knowledge from data (Madill, Jordan & Shirley 2000)	Subjectivist/ constructivist: Non-dualist. Subjective. Multiple perspectives sought.(Knowledge is construction of inter-subjective meaning	Constructivist: Concepts are constructed Construct knowledge from experiences in social inter-action. Subjective. Mutual knowledge creation.
Reason-ing	Inductive theory discovery and generation	Interpretive.	Abstract interpretive reasoning (Hall et al. 2013:20)
Research method	Systematic method. Core category- focus. Verify.	Enquirer not separate from method. Core- category focus. Seeks truthfulness by verifying.	No core category-focus. Voices of enquirer & participant co-construct data & analysis.
Aim of research	Explanatory theory. Hernandez & Andrews (2012) Discover latent patterns of behaviour in the data. Focus is core category	Construct and explain reality. Generalisation not focus	Descriptive theory "A picture that draws from, reassembles, and renders subjects' lives" (Charmaz 2003:270
	The relativist approach places emphasis on multiple perspectives according to the conviction that truth/ reality is relative, and, is not overly concerned about the identification of a central issue of concern (Martin 2006). Breckenridge at al. (2012) **constructivist *research outcome*** *(*developed theory) stems from the conviction that social reality is a co-construction of the inquirer and participant's understanding of lived experiences		

Sources: (Hall et al. 2013; Breckenridge et al. (2012); Holton 2009; 2007:269-270; Mandill et al.2000; Charmaz 2003; 2006; Lincoln & Guba 2005; Bryant 2009; , Mills et al 2006 ; Polit & Tatano-Beck 2006.

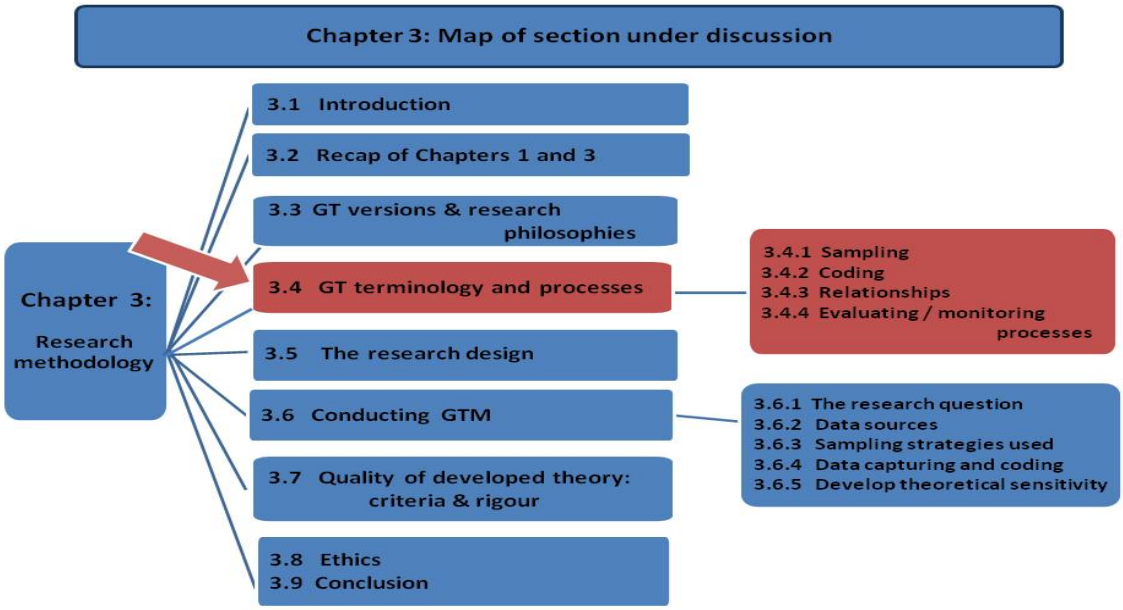
This section focused on the question of whether the combination of GT version and research philosophy is interchangeable. The literature quite clearly indicates that this is indeed possible depending on the type of research questions to be addressed and the envisioned outcome. The type of outcome and research question invariably links to underlying research philosophy.

3.3.3 Confirming research philosophy and GT version for this study

The ripple effect of the previous discussion was that the researcher of this study reflected on her own research philosophy as suggested by Birks and Mills (2010:8). The deduction was made that a post-positivist stance to classic GT can be assumed if convictions and anticipated research outcome were considered. However, the input by Bryant on a pragmatic research philosophy appears convincing. Therefore the stance of a classic GT methodology underpinned by a pragmatist/ constructivist philosophy was decided on (as explicated in Chapter 1 Section 1.5.2 and Section 3.3 of this chapter)). This conviction was furthermore strengthened by a more recent article by Urquhart and Fernandez (2013) who emphatically state that GTM is "neutral" and that the "level of epistemological neutrality makes GTM a highly usable research method". This view is readily supported by a pragmatist approach.

The next section of this chapter will therefore deal with these issues before moving on to detailing the components and terminology of the classic grounded theory approach, also referred to as the Glaserian version of GT methodology.

3.4 GT terminology and processes



Given the general explanation of the GT method (Section 2.3.1.1 and Figure 2.1) this section explicates classic GTM terminology and processes which differ in some respects from the terminology of the other main GT versions. Terminology of the other versions is not included to keep the discussion within manageable proportions. The components to be discussed include:

- Sampling terminology and sampling processes (substantive area and data sources, data slices, data units, incidents and events, purposive and theoretical sampling)
- Coding terminology (open code, substantive code, categories, attributes and properties)
- Evaluation criteria and processes (constant comparison; densification; saturation; memoing; theoretical sensitivity)
- Expression of relationships (core category; theoretical coding and sorting)

3.4.1 Sampling terminology and sampling techniques (substantive area and data sources; data slices, data units, incidents and events; purposive and theoretical sampling)

3.4.1.1 The substantive area and data sources

In GT the area of enquiry (Munhall 2007:248) is referred to as the *substantive area* (Urquhart et al 2010: 362) and has the property that information of relevance to the research is imbedded – in different data sources - in this field. The substantive area is loosely akin to the target population of quantitative and mixed methods research terminology. The substantive area may include several data sources and GT has a very flexible approach to what is considered data and data sources. The flexible approach is rooted in Glaser's (1998:8) well-known comment that "all is data".

When planning research, sources that might yield relevant information are identified as potential data sources. GTM allows data to be sourced from more than one source and additional sources can still be identified and sourced as research progresses and theory develops. Because of the theory-emerging property of GTM the data sources of relevance (at particular stages of the research) cannot be pre-determined: theory development dictates which data source will be best suited at a particular stage to further inform specific concepts or areas of uncertainty regarding developing theory. *Data sources* can be quantitative or qualitative and data can be collected by any appropriate means, for example interviews, observational field notes of researchers, literature of relevance to the study, and open- and closed-ended questionnaire (Charmaz 2012:68-72). To this list Glaser adds brief comments made by interest parties, text in books, journals, magazines, newspapers, documents and observational notes (1998:8) which illustrate the open approach to what is considered data and data sources.

Flexibility regarding data sources and data collection methods should however not be interpreted as indifference towards the quality of data and research – labelled research rigour (addressed in Section 3.7). Charmaz for example, touches on one aspect of data quality by cautioning against the introduction of bias during the data collection process that can occur when researchers bring in personal preconceptions while capturing, for example interviews in abbreviated format: data should be objectively recorded. The principle applies to all data collected from data sources (2012:71).

In the current research, to avoid bias, the option of interviews as data collection option was weighed against an open-ended questionnaire option where written participant responses would be collected. The research opted for the written participant responses (open-ended questionnaires). This option was selected to pre-empt the possibility of introducing bias in the data if the crux of interview responses were captured by the researcher of this study. Written open-ended questionnaire responses (the participant's own words) were argued to be free from researcher bias (Charmaz 2012:72).

3.4.1.2 Data slices, sampling units, data events and -incidents

3.4.1.2.1 Data slices and sampling strategy

An entity of data collected from a data sources is referred to as a data slice (Glaser and Strauss 1967). For example, the verbatim electronically recorded interview response of a research participant on a specific issue represents a data slice. In contrast to conventional or quantitative and

mixed methods research that collects data according to a pre-planned sampling schedule or strategy, data to be sampled in subsequent analysis cycles of GT implementation is dependent on emerging conceptualisation of preceding cycles. In other words developing theory dictates data source and data slice in subsequent cycles. The crux of the argument is that a fixed sampling schedule cannot be set prior to completion of research, which then presents as an "as-executed sampling schedule" (Fernandez 2004:89). Section 3.4.1.3 on theoretical sampling describes this sampling technique in more detail.

In agreement with the above reasoning, Section 3.6.2 will indicate that responses to open-ended and closed-ended questionnaires; observational field notes of the researcher of this study (as research support statistician) on research process interactions with researchers; literature; documents and a set of published articles of researchers that the author of this thesis supported in a statistical capacity; and field notes on informal discussions with academic researchers, all served as potential data sources in this ROP study. By means of theoretical sampling, data slices were collected from these sources (that were identified as relevant and available). The decision on the most effective way of collecting data from these sources will also be discussed in Section 3.6.3 (Urquhart et al 2010:362; Glaser and Strauss 1967; Fernandez 2004).

3.4.1.2.2 Data events, incidents and data units

Each data slice collected from a data source contains numerous data-units. A data unit refers to a meaningful event or incident in a particular data slice (e.g. "academic qualifications", "writing skills"). This increment of data represents an analysable unit of information.

GT versions regard and define data units differently. Some GT approaches analyse information or responses word-by-word (e.g. Straussian GTM, Strauss and Corbin 1990); or line-by-line (traditional Glaserian GT, according to Charmaz 2012:50; and some versions of Constructivist GT); or simple-event descriptions (more recent classic GT versions). Fernandez (2004: 87), as a more recent classic grounded theory researcher, proposes as data unit, a response of a string of words or text - that may include more than one sentence or even an entire paragraph - that describes a single meaningful event or incident. He argues that the purpose of coding is to eventually conceptualise, and such conceptualisation are deduced more from phrases or sentences that single words. The data unit should be selected or split in such a way that the event in this data unit can be labelled with a very cryptic label during analysis (please refer to coding, Section 3.4.2). For example, 'the way things are reported on in research' could be coded as 'research writing skills' or 'writing skills of a researcher'.

Data units in this research will be regarded as simple incidents and events in a sentence and/or phrase as suggested by Fernandez (2004: 87). This assumption of a data unit also agrees with the classic grounded theory approach (Glaser 1998). Fendt and Sachs (2008) based their on the Straussian GT approach, that applied a word-by-word analysis approach. In reflection they caution against this laborious and time-consuming approach that may lead to over-objectification. According to their reflection, this approach did not lend additional rigour to their research and/or quality to their developed theory.

3.4.1.3 Theoretical sampling and purposive sampling

A distinguishing feature of theoretical sampling is the fact that theoretical sampling continually samples data slices 'on demand' in data collection-analysis-comparison cycles of GT implementation.

This is in contrast to the 'once-off' sampling approach of other sampling techniques. Theoretical sampling enables the process of inductively developing theory from data, over a broad scope of the data, one step at a time (Jones and Alony 2011; Jeon 2004).

Theoretical sampling is a concurrent and iterative process of data collection and continues from the onset of grounded theory implementation to the final stages of theory formulation. Glaser and Strauss (1967:45) define theoretical sampling as "deciding, on analytical grounds, where to sample next". Fernandez (2004:86), Covan (2007:63), Van Niekerk and Roode (2009:101) furthermore explain theoretical sampling as the process of collecting data with the intent of developing theory about a process or phenomenon. Selection of subsequent sampling entities is dependent on the information obtained from previous sampling and analysis cycles (this refers to the "analytical grounds" which Glaser and Strauss (1967:45) mention in their definition of theoretical sampling). In the sampling process the researcher anticipates that data will be sampled from an identified selection of potentially relevant data sources, but cannot plan how sampling from these sources will proceed (Fernandez 2004:89). Other sources may even be added as theory development dictates. As concepts start to emerge, new data is specifically sampled from suitable data sources that, at a particular time, best inform and further explain the emerging concept/s, conceptualisations, abstractions of conceptualisations, theoretical categories (the building blocks of a theory), refinement of categories, and relationships (that integrates the building blocks into an integrated whole).

Theoretical sampling is therefore motivated by the need for additional information to inform specific aspects of emerging theory (Van Niekerk and Roode 2009:101). Stern (2007:117) indicates that theoretical sampling is a way of sourcing information that will advance theory development. Theoretical sampling provides a means of obtaining additional information that explains, or enhances, or contradicts an idea or concept or a particular theoretical category that prior data cycles suggest (Charmaz 2006). It refines or verifies conceptualisations and relations and gradually advances theory development to higher levels of abstraction. More recently theoretically sampled data ensures (verifies) that theory develops from the data and is relevant to the message contained in the data – a process known as data fit (Glaser 1978).

Theoretical sampling provides the information collection tool to enable all aspects of theory development: clarification of categories, core category emergence and relationship building (to which the processes of coding, densification and saturation contribute – please refer to Sections 3.4.2 and 3.4.4. In essence, proper and adequate theoretical sampling forms the cornerstone of developed theory that, according to Urquhart et al (2010), "works and fits". This is the basic property of rigour in research (Urquhart et al 2010). Likewise, Jones and Alony (2011:106) and Jeon (2004: 252) emphasise that proper theoretical sampling advances the rigour of the research.

In the commencement phase of research, theoretical sampling does not apply, the reason being that when research commences prior knowledge 'from the data' is not available to guide subsequent cycles of analysis and sampling. In the commencement phase, when research topic and theoretical structure are vague and uncertain, data is purposively sampled from a data source that, to the researcher, seems most relevant. Sampling includes sourcing data over a broad area - to inform in general. When conceptualisation starts to emerge theoretical sampling moves in to direct and

inform more specifically. This aspect is discussed in more detail in Chapter 4, explaining the commencement phase of this research.

3.4.2 Coding terminology (open-, substantive code, categories, attributes and properties)

3.4.2.1 Substantive code: open or initial code and conceptual code

Different code types are linked to GT coding (also referred to as 'analyses'). The type of code in (classic)[41] grounded theory is associated with the level of conceptualisation or abstraction the code represents. Code-terminology used to code data include open or initial coding; substantive or conceptual code; categories; core category/ies and theoretical code. Before explaining the code-type, the essence and purpose of coding and the operational process that underlie coding is briefly sketched.

The purpose and essence of coding

The purpose of coding in GTM is twofold, namely, to: (ii) generate a set of comprehensively defined categories[42] grounded in data and (ii) to integrate these categories into a conceptualised theory that explains a phenomenon of concern within a substantive area (Glaser 1978: 56). Coding is the fundamental analytic process of GT (Corbin and Strauss 1990: 12) and involves a process that gradually moves from the naming of simple data events or incidents in collected data to coding abstract conceptualisations, relations and integrated code that presents as conceptualised theory. Stated simply, code defines what the researcher "sees"[43] in collected data (and conceptualisations) (Bryant and Charmaz 2007a: 605). However, what researchers 'see' and 'code' at any given time in the coding process is governed by the level of advancement (conceptualisation) of the coding process. In this regard a distinction can be made between substantive and theoretical code. Substantive code can furthermore be split into open and conceptual code, explained in the next paragraph.

The process of coding

The principle of Glaser's coding process (1978:55-56) are very aptly summarised by Holton (2007: 266) when she writes:

> The conceptualisation of data is the foundation of grounded theory development. The essential relationship between data and theory is a conceptual code. Coding gets the researcher off the empirical level by fracturing the data, then conceptualising the underlying pattern of a set of indicators within the data as a theory that explains what is happening in the data. Coding gives

[41] In the remained of this chapter – and in Chapter 4 – 6 to follow – reference to 'grounded theory' will imply 'classic grounded theory' – unless a very pertinent property is referred to. In such instances 'classic grounded theory' will be specifically mentioned.

[42] C*ategories* are advanced conceptual code; and "categories grounded in data" refer to code that *works* for the data, *fits* the data and is of *relevance* to the substantive area

[43] In this thesis direct literature quotations are either blocked as an indented paragraph or indicated in sentences by double quotation marks (two inverted commas, ", and two apostrophes, "). Single quotation marks (one inverted comma, ', and one apostrophe, ') are used to indicate terminology, or labels, or concepts or indirect reference to the literature quotes. For example Bryant and Charmaz (2007a:605) comment on what researchers "see" in the data (using double quotation marks). However, when this study indirectly refers to such a literature comment, single quotations marks are used: e.g…… in this study, what researchers 'see' and 'code' at any given time …….

the researcher a condensed, abstract view with scope and dimension that encompasses otherwise seemingly disparate phenomena. Incidents articulated in the data are analysed and coded, using the constant comparison method, to generate initially substantive and later theoretical, categories.

To achieve this kind of explanation, collected data (collected in each collection-analysis-comparison cycle) is initially split into useful information chunks that describe simple events or incidents and then named (coded) while constantly comparing more recently sampled data units (and code) to prior coded data incidents. The intent of coding and comparing is to discover and conceptualise underlying ideas in clusters of initial code (these initial empirical code acts as indicators/ or ideation of a conceptualisation/s). In this way a cluster of initial code is elevated to a higher level of abstract conceptualisation that does not directly reflect the single 'empirical life situations' but rather the concepts that such a cluster of initial or open code suggests. Ideas do not need to initially spring from sets of code – a single event can initially trigger an idea (such an idea is then followed up in further data sampling and collection cycles). The cyclical process of collecting, coding and comparison is interactively executed with initial/open code being constantly compared to other initial/open code; to concepts already identified; to conceptualisations; to possible links between code, and the like. Conceptualisation that arises from comparisons is increasingly coded as more abstract conceptualised levels of code, and intermittently renamed (coded) with labels that express these higher levels of suggested abstraction. The process gradually moves away from describing incidents in the data towards ideas that form about these incidents. While coding, memos (refer to Section 3.4.4) are intermittently made of why and how evolving code transpires. Gradually abstract code (referred to as conceptual code or substantive code) replaces initial code, resulting in a reduction of total code where the naming of such conceptual code then overarches the meaning of initial clusters of code as comprehensive concepts or sub-concepts (initial code is 'dropped' from the analysis but a track record is kept of initial code). Once coding progresses to the stage where abstract conceptualised code describes a greater abstract concept, theoretical sampling concentrates on selecting data to inform and enrich specific details of the greater concept. This higher and more comprehensive form of conceptual code is referred to as a category (e.g. feelings of anger, sadness, joy, resentment describe 'emotions') and, by theoretically sampling very selectively, collected data serves to fill in and clarify detail aspects of a comprehensive concept – referred to as densification of the category. At this stage the central theme of the research (the central concept/category) in the data becomes more obvious and can be defined and coded as such: the core category. The core category relates to most other categories and forms the centre piece of theory development and structuring.

The operational process of coding is supported by processes termed, constant comparison; saturation; densification; and memoing (refer to Section 3.4.4). These processes are in operation throughout the collection-analysis-comparison cycles and become more pronounced in the advanced and concluding phases of GT execution.

The identification of the core category signifies theory advancement and that relational links between the core category and other categories (and within categories and sub categories) are emerging. Relationships are described by means of propositions (also referred to as theoretical code) that serve as viable explanations of identified relationships (Glaser and Strauss 1967; Holton 2007:265; Urquhart et al 2010:360). Continued category and relationship comparisons, and

memoing of the dynamics of the process culminates in memos being sorted and the framework of a theory established. This integration process then tells the story of a developed abstract theory that explains a phenomenon of interest to the researcher. The next section details the various types of code associated with the operational coding process.

3.4.2.1.1 Open code or initial code

In collection-analysis-comparison cycles, coding initially starts off by naming simple events, actions, patterns, themes, and relations in terms of the basic message (Star 2007:75-94, 605) that data events signal (Douglas 2003:49; Star 2007:75-94,605). The purpose of an open code-label is to concisely describe "what is going on in the event" (Fernandez 2004:86). Coding raw data incidents is referred to as open coding (initial substantive code). The objective of open coding is to produce large amounts of code over the whole spectrum of the substantive area and gradually link and cluster these codes and what they suggest to as many conceptualisations and ideations as will fit the data (Glaser 1978:56; Holton 2007: 265-290, 605). This is done via cycles of constantly comparing codes. The purpose of volumes of open code is to provide enough information over a broad general field to stimulate the recognition of underlying pattern and concepts in the substantive area. Charmaz (2012:48) advocates that open coding is a relatively straight forward process which is executed with speed and spontaneity.

3.4.2.1.2 Conceptual or substantive code; categories and core category that represent higher order conceptualisations

Glaser refers to substantive code as "code that conceptualises the empirical substance of the area of research" (1978: 55), in other words, code seeking to identify ideas and conceptualisations embedded in simple data events collected in the substantive area. Holton (2007: 275-276) adds to this by describing code associated with the process of gradually conceptualising data incidents in the substantive area as substantive coding.

The question on how to move open coding forward towards conceptualisation and conceptual code springs to mind at this stage. According to Glaser (1978: 57), constant comparison and regular memoing greatly assists abstraction, which Charmaz (2012: 50-71) supports. Questioning the data and 'knowing the data' furthermore assists conceptualisation. Questions that stimulate conceptualisation ask:

- What does this data stand for? What does this data represent? ("What is this data a study of?" Glaser 1978: 57). These question prompt focused conceptualisation.
- What category, or, property of a category, or part of the emerging theory does this incident refer to? ("What category does this incident indicate?" Glaser 1978:57). These questions prompt conceptualisation, relational links, and theory development.
- What is actually an underlying event in the data? ("What [structural] process manages the substantive problem to make life viable in the action scene?" Glaser 1978:57). These questions prompt core category identification and theoretical coding.

Furthermore, knowing the data advances conceptualisation and is encouraged by personally coding sampled data.

3.4.2.1.3 Categories as higher order conceptual code

Categories represent higher order abstraction of substantive code. As such, categories form the building blocks of a theoretical framework and condense the message of numerous open code and

'lesser' conceptual code into a few comprehensive constructs that underlie the description and structure of the phenomenon investigated. In GT methodology the aim is to develop a parsimonious[44] theoretical structure. Categories therefore develop as abstractions of the underlying messages ensconced in the data and initially presented as open codes. [For example, open codes such as 'ignorance of sampling methods', and 'inability to interpret quantitative statistical results' and 'knowledge of stats techniques', though not similar in knowledge-direction, jointly send out the message of 'statistical literacy' since the open codes remind the reader of conceptualisations of 'knowledge of statistics' whether the knowledge is lacking or adequate]. Dey (2007: 168) quotes Glaser and Strauss' definition of categories which proclaims categories to be: "conceptual elements of theory" (1967:36).

Categories are initially tentative and evolve gradually with some of these initial categories eventually slotting in as subcategories under a more overarching category (Gerrish and Lacey 2006: 198). By constantly comparing more recent code to an evolving category, the conceptual level of the category is enriched (densified) with related concepts that form subcategories or attributes and properties of categories (Holton 2007: 275-279; Dey 2007: 168). Properties of categories refer to characteristics of a category (or sub category) and the dimensions of a category describe the range of values that properties of a category can assume in the substantive area of study (Tan 2010: 105; Strauss and Corbin 1998: 117). Dimensions and properties detail categories thus refining components of theory Glaser (1978: 55-92). An attribute of GT methodology is that the method strives to develop a parsimonious theoretical model with a limited number of categories and a core category.

How to facilitate category identification and densification

The question might well be asked how densification is best achieved. Charmaz (2012: 49, 136) provides excellent advice regarding coding for categories when she suggests naming categories as gerunds ('ing'-words or phrases such as 'being selected for lay-off'; or 'dying of cancer'). Gerunds imply verbs (thus activity) and/ or processes which stimulate the researcher to consider the various properties and dimensions of the process and activity. In this regard Fernandez (2004: 54) argues that if a noun is used to name a category the idea of a static topic is suggested. A static topic (noun) does not imply action and action prompts the brain to think of sequences, or consequences or effects or timing or preventative actions: the brain becomes innovative when gerunds/ verbs are suggested and prompt researchers to think about actions - this forms part of the researcher's theoretical sensitivity (refer Section 3.4.4). Theoretical sampling and coding terminates when no more new data incident/ideas are collected that inform the dimensions or properties of categories (or relationships) (Holton 2007: 275-276; Kelle 2007: 195, 199). Such categories are assumed to be saturated.

3.4.2.1.4 The core category

The core category bridges the ground between substantive code and theoretical code (Eaves 2001: 655. Kelle 2007: 199) and some researchers rather group the core category as theoretical code (to be discussed in the next section). However, for the logical flow of this discussion the core category is regarded as part of substantive code (e.g. 'category' code).

[44] An attribute of GT methodology is that the method strives to develop a parsimonious theoretical model (Glaser 1978:10)

The core category embodies the central theme of research and serves as the anchor to which all categories are linked and interlinked (Fernandez 2004: 89). Theory development is taken a step further once the central theme of the study is identified. The next paragraph serves to explain the importance of core category emergence before embarking on a discussion of the characteristics of the core category and its ability to delimit the substantive research field.

The core category emerges after a period of substantive coding and is defined as the pivotal process of concern of the phenomenon being studied (Fernandez 2004: 89; Van Niekerk and Roode 2009: 100). Fernandez (2004: 89) stresses that substantive coding is a key element in the identification of the core category. Furthermore, no theory can be developed without a core category (Adolph, Hall and Kruchten 2011: 503) because the core category serves as the integrator of all other categories into a theoretical structure. Van Niekerk and Roode (2009: 101) affirm this.

Criteria that distinguish a core category from other conceptual categories include the features of the category identified as the one "most connected" to other categories; occurs and recurs frequently in the data/ coding/ memos; exhibits a stable pattern of behaviour; and links and relates to most of the other conceptual categories (Adolph et al. 2011: 503). Furthermore the core category accounts for most of the variation in the data; requires a lot of input to saturate (data and time wise); enables the researcher to quickly and easily detect relationships to other categories; remains central and relevant throughout the entire research process; incorporates a wide range of variations of incident (of a concept) in the developed theory; is in itself part of the researched problem; and has the capacity to integrate categories of relevance into a densified theory that explains the researched phenomenon in theoretical terms (Fernandez 2004: 89; Glaser 1978: 93). These distinguishing features guide the theoretical sensitivity (please refer to Section 3.4.4) of the researcher to ask: "What poses as the main concern of the data?" (Corbin and Strauss 1990: 14)

Clarity on the core category also allows the researcher to delimit the substantive area of research (Glaser 1978: 93; Fernandez 2004: 55; Van Niekerk and Roode 2009: 101). Delimiting a study implies that issues and events that impact the core category are investigated: "only variables related to the core [category] are included in the [further development of] theory" (Glaser 1978: 93). Research is delimited by selectively sampling only data (via theoretical sampling) that inform ideas, informally hypothesised relations (referred to as propositions in GT) and concepts that relate to categories that speak to the core category (and the core category itself). Selectively sampling and analysing such data ensures that the research, time-wise, progresses more effectively towards saturating categories and informing ideas regarding possible relationships and interrelationships between categories and the core category (Adolph et al. 2011: 503; Van Niekerk and Roode 2009: 100). Barker, Jones and Britton (2002) comment that once the core category is decided on relationships can be informally hypothesised (propositions made) by means of theoretical coding – which is the next type of code to be discussed. A core category is therefore essential in integrating the element of theory into a plausible framework that assists in eventually delivering a theory that is dense and saturated (Fernandez 2004: 89; Glaser 1978: 93).

Comment

Confusion often arises when authors refer to 'code', 'conceptual code', 'substantive conceptual code', 'categories' and 'densified categories'. Kelle (2007: 199) addresses this issue by indicating that

'code', 'substantial code' and 'conceptual substantive codes' are synonymous with 'categories' and 'comprehensive/enriched categories', which assists in understanding the reference by different developers to 'code', 'conceptual code' and at times to 'categories'.

3.4.3 Expressing relationships: theoretical coding and sorting

The concept of theoretical code is more readily understood in the context of this discussion if reference to 'substantial code' in the discussion below is read to imply 'categories, core category and their properties'.

3.4.3.1 Theoretical coding: why code theoretically?

Theoretical code enables theoretical integration of conceptual code and, acts as theoretical integrators (Holton 2007: 283). Theoretical integrators in this sense refer to links and relationships. Kelle (2007: 199) links theory integration directly to substantive code[45] by describing theoretical code as terms that describe the possible relations between substantive codes which builds theoretical models (theory). Theoretical code therefore offers explanations of relations or propositions. The analogy of signposts (aka explanations) along the freeway clarifies the purpose of theoretical code: theoretical code acts as 'signposts' on the road to structuring and integrating substantive code into theory: how to label conceptualised categories; how to hypothesise relationships between these categories; and how to investigate these plausible relationships (Jeon 2004: 253).

These relationships (initially captured as memos) become apparent and mature into hypothesised relationships or propositions that offer explanations on the nature of relationships (Kelly 2008: 267-281). Along these lines, Hernandez (2009: 52) and Kelle (2007: 199) describe theoretical code as the relational model that relates substantive code to the core category of the research phenomenon through hypothesised relational statements. While initial substantive code splits the data of the researched phenomenon into its elements, theoretical code conjures how conceptual substantive code can – through informal, relational propositions – relate as an integrated theory which tells the story of the whole (Glaser 1978: 72). Theoretical code opens up the structure of the underlying pattern in the data and explains how the substantive codes interrelate via proposition/ relationships - towards solving the main concern of the research (Glaser 1998: 163; Hernandez 2009: 53). Charmaz (2012: 63-66) adds to Kelle, Glaser and Hernandez's description of theoretical coding by indicating that theoretical coding is a more sophisticated or abstract form of coding than substantive code: it conceptualises how categories relate by coherently structuring a framework of the emerging theory. Charmaz (2012: 63) states that theoretical coding "clothes the analytic story in a theoretical cloak". Theoretical code is therefore integrative relational code. Glaser and Holton (2005: 5) wraps up the definition of theoretical coding with the statement that "theoretical code is the narrator that bind substantive codes into an integrated whole".

3.4.3.2 How does theoretical code assist in integrating theory?

The question might well be asked how theoretical code integrates and what constitutes 'relational links'. To answer the question, it should firstly be noted that substantive coding and theoretical

[45] Substantial code in the discussion below understood to refer to categories, the core category and properties and dimensions of categories.

coding are not mutually exclusive events executed in linear sequential fashion but are interactively applied: during the process of substantive coding and refinement, theoretical code start to suggest itself in the form of ideas about relational conceptualisations that links elements of substantive code. Theoretical code cannot develop without rich substantive code.

To integrate substantive code, knowledge of the building blocks of theory, theory compilation and code that integrates - thus specific types of relational links - is required and such knowledge assists and sensitises the researcher in detecting patterns in the data and substantive codes in the research area (Holton 2007: 283). With this statement Holton hints at knowledge of 'theory types' or a collection of generic theories – a reference to a set of coding families compiled by Glaser – still to be discussed in this section. Relational links could, for example, be causal effects; a process-hierarchy of 'going through stages'; associations (cultural affiliations); influences; conditions; context; consequences and the like (Urquhart, Lehmann and Meyers 2010: 367; Hernandez 2009: 53; Glaser 1978; 1998; 2005). [The next subsection on coding families, as well as Appendix 3.1, will indicate various other forms of relationships that constitute examples of generic theories. Glaser refers to the compiled lists of the components of such theories as coding families]. Charmaz (2012) explains formulation of relations as informal sets of propositions (or hypotheses) that integrate the theoretical outline of the study and the theory as such. Hypothesised statements assist the researcher in proposing provisional relationships and interconnectedness between concepts on a more abstract conceptual level. These proposed provisional relationships suggest the most probable explanation for describing or resolving the researched phenomenon. This process eventually leads to a final outline of the theory and theory formulation to resolve the research concern. Cutcliffe (2000) stresses theoretical coding and the postulation of previously unarticulated relationships (between categories) as critical in theory development.

Typical theoretical codes can for instance formulate relations within or between conceptual categories in terms of cause[46], and/or consequence, and/or contingencies, or context, etc., by asking particular questions of the data. A specific conceptual category can for instance stand in a causal relationship to the core concept/category of the study and in a consequential relationship to another category. Relationships are then integrated (as informal hypotheses) into a theoretical model by means of theoretical code. By effectively coding (theoretically), developed theory acquires a sharp analytical edge (Charmaz 2012).

In an attempt to address the 'how to' of identifying and structuring relational links and categories into an integrated theory, Glaser (1978: 73-82; 1998: 163-175; 2005: 10-14) compiled generic theoretical frameworks[47] of how typical theories are structured around basic theoretical constructs and relationships. The intent of the compiled lists was to expose researchers to existing theoretical models and theoretical knowledge (how theory works) and, furthermore, to provide a store of theoretical code models. In other words, the store comprises typical theoretical components and typical types of relationships. Theoretical knowledge in various research areas aids openness to an array of possible theoretical models, combinations of models and elements in these models that

[46] The consequence and causal type of relations for example resort under the 6 C's theoretical family of Glaser to be discussed in the next subsection and listed in Appendix 3.1].

[47] The theoretical families or frameworks lists concepts and indicates relationships but do not detail concepts and relationships which is confusing to inexperienced GT researchers

might be applicable to theory development in the researcher's substantive area (Glaser and Holton 2005: 3).

3.4.3.3 The process of theoretical coding

Wuest (2007: 254) and Charmaz (2012: 65) both state that the application of theoretical coding is not well documented and that the process is challenging. Researchers differ on what resorts under substantive and under theoretical code. Wuerst (2007: 254), for example, includes category refinement and properties/dimensions of categories as resorting under theoretical coding, while others (Glaser 1978) place category refinement and densification under more advanced substantive coding. As mentioned earlier the stance of this research is to group densified categories under advanced substantive code.

Some researchers find reference to the terms, theoretical code, theoretical code models and theoretical coding confusing (Glaser and Holton 2005: 12). Glaser and Holton (2005: 1-21) state that theoretical codes are "abstract models" that are developed during the sorting and memoing phases of GTM analysis. In other words, theoretical code is regarded as a model or theory of a phenomenon of concern which describes the dynamics of the phenomenon. Other researchers view theoretical codes as further abstract formulations of substantive code elevating descriptive substantive code abstract conceptualisation (Glaser and Holton 2005:2). This study will take the stance that theoretical codes model theory (describing the relational links that tie the elements of a theory together), thus explaining or resolving the phenomenon being investigated.

Memos make up a critical part of theoretical coding because memos serve as a 'bank' of ideas that informally come to mind during cycles of research execution. Latent ideas on possible relationships therefore also form part of these memos. By revisiting memos, propositions explaining relationships transpire which assist theory formulation in the advanced cycles of analysis. Memos writing and theoretical coding furthermore go hand in hand with theoretical sensitivity: by pinning down conceptualisations as ideas and relationships in memos insight crystallises and sensitivity develops to identify underlying patterns in the data.

3.4.3.4 The origin and purpose of coding families (Glaser 1978: 73-82; 1998: 163-175; 2005: 10-14)

To facilitate theoretical coding (and the recognition of relational links in substantive code) Glaser (1978; 1998; 2005) summarised the most commonly used theoretical terms and relational links - primarily from the social sciences fields - into subsets of listed code which he referred to as theoretical coding families. These sets of prior established categories/conceptual codes and relations[48] are grouped under central themes to guide compilation of theoretical frameworks while executing (new/ independent) research. The theoretical coding families therefore form exemplars of existing theory. The most commonly occurring of these coding families are listed in Appendix 3.1. For example, the 'Identity self'-coding family included in this list (with conceptual categories of self-image, self-concept, self-worth, self-evaluation, identity, social worth; self-realisation; transformation of the self) might be of relevance and serve as a comparative framework in situations where research for example ask, "what is regarded as the self", and "what is not self?" (Gibson, Gregory and Robinson 2005: 11).

[48] Theory established in independent research studies.

The coding families supply examples of relations and conceptual constructs commonly encountered in theory development and theoretical frameworks: it introduces 'theory terminology', but by no means presents as an exhaustive or mutually exclusive list of theoretical models. To researchers the list serves as a knowledge base, guideline and 'reminder' of the types of abstractions that can be made in theory definition - with great emphasis on coding family/families that fit the data (Glaser 1978; 2005). The families contribute towards theoretical sensitivity of researchers (the 'know-how' of theories). Coding families act as templates to compare conceptual/substantive code of a study. Such comparisons aid decisions on whether the data of a particular study fits the framework of conditions of the specific theoretical coding family. GTM advocates theory that develops from the data. Therefore in evaluating the suitability of coding families as framework, theory emergence should come from the data in the first instance and not from preconceived theory (such as a specific coding family). The theory-example should not force the data.

Munhall (2007: 254) agrees with the idea of theoretical coding families as outline-templates of plausible relational models. If born in mind that theoretical families represent existing theory, the logic of the mentioned emphasis which GTM places on the skill of theoretical sensitivity for structuring theory becomes very obvious: knowledge of theoretical coding families broadens the researcher's theoretical knowledge repertoire, which enriches his/her theoretical sensitivity and skills to "think theory" and theory-structure and recognise/identify conceptual links embedded in the data: knowledge of theory "exercises" the theoretical reasoning processes (Glaser 1978). The wealth of concepts and relational constructs captured in the theoretical coding families provides a 'concepts-bank' for the researcher and develops the ability to reason about data-observations in theoretical language (Kelle 2007: 200). Coding families create familiarity with theoretical language, theories, conceptualisations, relations and theoretical frameworks.

The shortcomings of theoretical coding families

A shortcoming of the theoretical coding families however is that Glaser does not provide a comprehensive description of how the given theory components function as a theoretical framework. Neither does he explain how theoretical coding (theory formulation) should be undertaken (Munhall 2007: 254). The process of theory formulation, especially for new researchers, is hampered by the absence of guidelines on how to structure emerging theoretical categories into a theoretical framework (Kelle 2007: 200). Concepts, categories and relational links are listed but how the components should be integrated into a theory is not elaborated on.

Another concern raised is the fact that Glaser (1978; 1998; 2005) indicates that more than one coding family can be incorporated into new, developing theory but does not indicate when a new emerging theory can be regarded as a coding family (Charmaz 2012: 65). Charmaz indicates that coding families mostly stem from the social sciences (2012: 65) and that the application field of GTM currently (referring to the year 2012) extends beyond the social sciences owing to development in new application fields (IT, nursing, health, and mining). Thus a need exists for elaboration on listed theoretical coding families and extension of the list to include generic theoretical frameworks from newer research fields.

In summary, theoretical coding families serve to stimulate theoretical sensitivity; and familiarity with theory terminology in general; a facility for theoretical language; and familiarity with the elements of theory but does not practically guide towards theory development in a research study. Please refer to Appendix 3.1 as well for suggested improvements by Charmaz (2012) and Kelle (2007) to simplify the interpretability of Glaser's coding families.

Comments
In GT studies theory can be developed without the use of theoretical coding families. These families are not a prerequisite for theory development but they often render the researcher more theoretically sensitive and mature which eases the process of structuring a theoretical framework and eventual theory formulation. The use of coding families is a researcher-dependent decision.

It is not always easy to recognise the elements of a specific coding family in the theory write-up of a researched topic. This is because researchers do not explicitly name the coding family/ies that underlie/s their research, preferring instead to supply labels for operand-categories and operations-categories that suit their study. These are not as easily recognisable as labels that appear in Glaser's list of coding families.

Charmaz (2012: 64) points out that several more recent coding families are not included in Glaser's list. For example, concepts that relate to power; networking; narrative; inequality; biography; post modernism; feminism, etc. As mentioned, this is understandable considering the timeframe of the origins of GTM and the fact that new coding families continually evolve as new research fields apply grounded theory methodology in their substantive areas.

An important deduction that can be made from the variety of theories covered in the theoretical coding families is that different theoretical frameworks (or combination of frameworks) can underlie the explanation of a researched phenomenon (Glaser and Holton 2005: 13) – which gives (classic) grounded theory a broad scope of application. [Straussian GT assumes one theoretical framework, the causal or 6C's coding family (Schreiber 2001: 63) to underpin all models developed].

3.4.4 Evaluation criteria and processes (constant comparison; densification; saturation; memoing; theoretical sensitivity)

3.4.4.1 Constant comparison technique

The method of constant comparison has been mentioned in an earlier discussion because of the technique's intrinsic role in the collection-analysis-comparison cycles of the GT application (Jeon 2004: 252). Constant comparison continually compares previously analysed information against more recently acquired information: more recent data incidents are compared to prior analysed data incidents (initial or substantive code), or to higher levels of conceptualisations (categories, core category), or to specific issues of these concepts (properties and dimensions of categories, or relationships between categories). Likewise previously identified categories and their properties/or dimensions are continually compared to more recently emerging categories, their properties or their dimensions, and to relationships between categories (Birks and Mills 2011: 11). The process of continually and repeatedly comparing more recent analysis results against prior results happens concurrently to data collection and analysis throughout GTM implementation. The purpose of

constant comparison is to identify, solidify and integrate identified concepts; underlying pattern; and hypothesised relationships between concepts, and to assist explanation of the main concerns of the research as a developed theory (Glaser and Strauss 1967: 102; Jones and Alony 2011: 105). Of importance is the fact that the process of constant comparison ensures that conceptualisations and theory building originate from collected data and not from presuppositions. Constant comparison acts as a control towards generation of a rigorous theory (Barnard 2007: 153).

As more and more categories and concepts evolve, constantly comparing conceptualisations stimulates the formulation of more abstract ideas/or concepts. Evolved categories conceptually sum up similar or related, more elementary-level events. For example, events such as 'the way findings are worded'; 'reporting on research', 'good use of English'; 'ability to do arithmetic'; could collectively conceptualise the concept of 'skills' or 'skills required'. Such conceptualisation, resulting from repeatedly comparing incoming information, moves the coding process forward towards abstract conceptualisation (Birks and Mills 2011: 11).

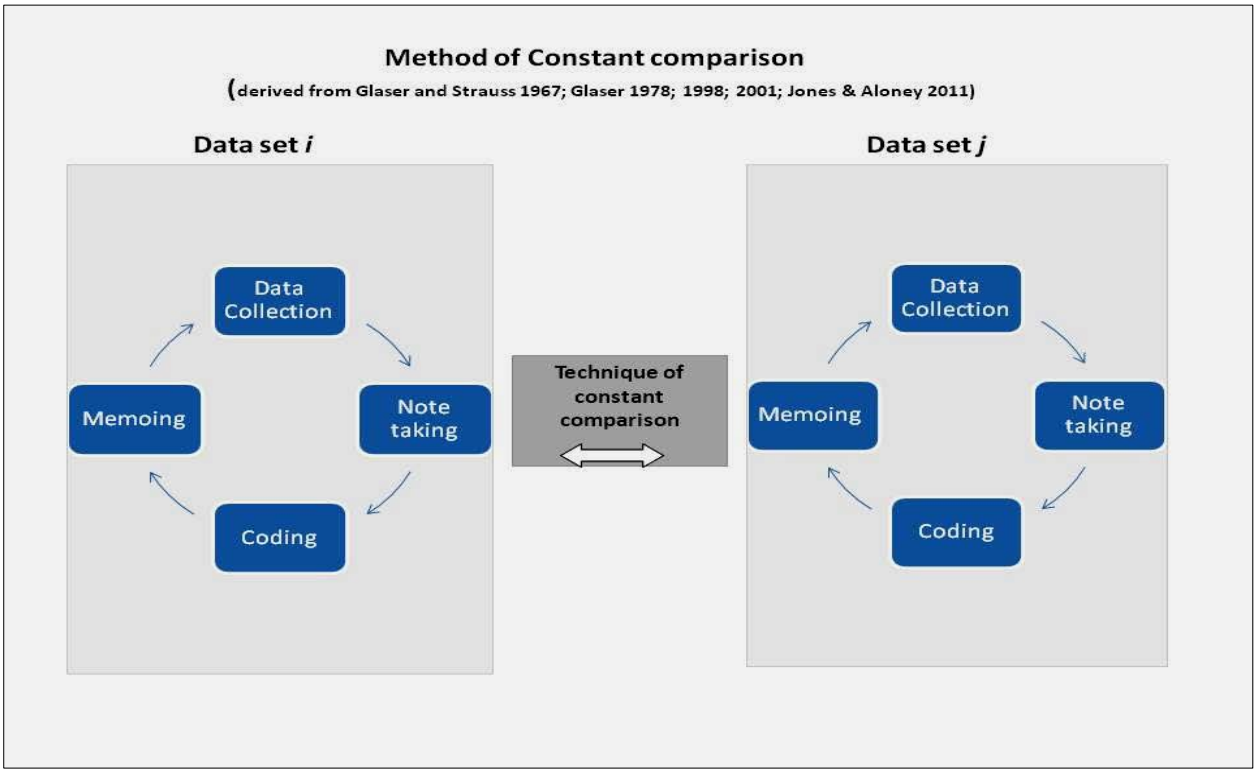
Glaser's assumption of "all is data" is of relevance to the process of continually comparing evolving theory. Information from the literature is therefore also regarded as data. Consequently, concepts and categories that emerge from collected data (which may be sources other than the literature) may be compared to concepts and patterns reported in the literature. In other words findings can be compared against existing theory described in the literature, if such theory exists (Charmaz 2012: 187). Such comparisons are of relevance in the later stages of analysis and data collection once the structure and pattern of developing theory start to crystallise from the data. The purpose of comparisons in this instance is to verify theory but also to assist in refinement of conceptualisations (categories and relationships) and simultaneously promote a deeper theoretical sensitivity.

The constant comparison technique does not lay claim as a technique that assists in testing theory. Application of constant comparison aims to advance theory development that is plausible and applicable to real life situations (descriptive). Rigour[49] in research and validity of results (theory), therefore, is based on theoretical sampling, comparison and coding to the point of saturation (please refer to Section 3.7) when no more new and significant knowledge is added to concepts or categories (Jones and Alony 2011: 105). The process of constant comparison therefore does not 'test' developed theory but delivers plausible, applicable theory that fits real life situations, and in this way proves to be valid because theory developed via this route is grounded in data.

A diagrammatic description of constant comparison is presented in Figure 3.2 and explains the comparative interaction between more recently collected and analysed information and information processed in earlier analysis stages. The diagram was adapted by Jones and Alony (2011: 105) from earlier graphical presentations by Glaser and Strauss (1967); and Glaser (1978; 1998; 2001).

[49] Rigour implies that an explanation / conceptualization is relevant to the phenomenon being investigated, is plausible and is grounded in the data (Adolph et al 2011).

Figure 3.2: The process of constant comparison in GT cycles of collection-analysis-comparison



3.4.4.2 Theoretical sensitivity

Glaser and Strauss comment (1967: 251) that the ability to theorise effectively – a skill required to formulate developing theory – depends on a researcher's sensitive insights, in other words, his or her theoretical sensitivity. Theoretical sensitivity is a researcher's ability to "render theoretically, their discovered substantive grounded categories" (Glaser 1978: 1). Theoretical sensitivity is the ability to draw insightful conceptualisation of the 'messages' underlying empirical data and to identify insightful relationships between these concepts (theoretical code). Insight to form abstract conceptualisations of events and to relate these concepts is based on a researcher's personal experience, work experience (previous and past) and knowledge of theory construction (Glaser 1978; Munhall 2007: 247). Knowledge of theory construction flows from knowledge of theory in many fields and creates awareness of the process of theorising and what is theoretically possible. Glaser finds it necessary for researchers to be theoretically well versed in related specialist research fields but not to the same extent in the researcher's own research field. As motivated in Chapter 2 (Section 2.3.1.3) this perception (of an almost theoretical ignorance in a researcher's substantive field) has changed dramatically since GTM inception, and knowledge of theory in a researcher's research field is accepted as a given. However, to ensure rigorous theory development, prior knowledge should be managed to preserve an open, objective approach to theory development to allow theory to develop from the data (Munhall 2007: 247).

The question might well be asked how theoretical sensitivity is developed and stimulated. Charmaz (2012: 135) answers this question by indicating that knowledge of many theories assists in developing theoretical sensitivity when theorising is put into practice: the researcher should stop occasionally to ponder and approach the phenomenon under investigation from a different angle.

Theorising means questioning and pondering ideas. It implies an innovative "playfulness" that enables researchers to identify the novel in the ordinary.

The method of constant comparison is a very effective means of stimulating theoretical sensitivity because it encourages the researcher to critically review data and conceptualisations from various angles (Jeon 2004: 253). Jeon (2004: 252) indicates that theoretical sensitivity and the method of constant comparison go hand in hand: theoretical sensitivity is maintained and developed via constantly comparing concepts, and constant comparison sensitises researchers to recognise new concepts or strengthens already identified ideas. In this way the researcher stays in touch with his or her data which ensures that theory is grounded in data. Theoretical sensitivity is furthermore stimulated by asking questions that force the researcher to think and understand the data. In this sense theoretical sensitivity can be regarded as a researcher's ability to see relevance in data and reflect on this: conceptualisation of the message contained in the data (Kelle 2007: 193). Theoretical sensitivity is the ability to identify properties and dimensions of such conceptualisations and their relationships with another categories and concepts (Van Niekerk and Roode 2009: 99).

The crux of theoretical sensitivity is therefore the ability to distinguish the building blocks of theory in data and the ability to assemble these parts into an integrated theory (or explanation) of the researched phenomenon.

3.4.4.3 Saturation and densification

Theoretical saturation can be regarded as a measure of introducing rigour into research. Categories (thus concepts) in GTM that are theoretically saturated ensure that these categories (and thus developed theory) are firmly grounded in data[50]. The definition of saturation explains the logic of this statement: theoretical saturation is achieved when continued data collection, analysis and comparison no longer generate new information to supplement what is already known about a category or its dimensions and attributes. Dey (2007: 185) describes the saturation point as the stage when "the ideas run out". When conducting GT research, a specific category can reach a point of theoretical saturation while others may still require further investigation. All categories are not necessarily saturated at the same time. Once theoretical saturation has been reached further theoretical sampling will serve no useful purpose (Fernandez 2004: 87) and sampling re the specific concept/category will cease (Morse 2007: 241). Van Niekerk and Roode (2009: 101) refer to category saturation as a phase in the collection and analysis of data when no new interchangeable events/incidents are found that are of relevance to the particular category. Densification of categories moves category development towards the point of saturation, because densification – adding relevant additional knowledge – clarifies and details categories, the core category and relational links.

In GT, theoretical saturation serves as guide to sampling adequacy. Sampling schedules cannot be designed for GT research because of the nature of theoretical sampling (sampling 'on demand'), but theoretical saturation serves as a means of evaluating sampling adequacy. Theoretical saturation implies that sufficient information has been sampled and that sampling on a specific category may cease (Munhall 2007: 249).

[50] Saturated categories have the property that they can accommodate a great variety of data events – which make categories rigorous.

3.4.4.4 Memos, writing memos; sorting memos

Defining memo writing

Memoing is a crucial component of the GT process towards theory formulation and category refinement (Jeon 2004: 253). Rigorous theory cannot be developed without dedicated and conscientious memoing (Glaser 1978) and memo-writing is in essence the researcher's informal write-up of his/her developing ideas about conceptualisations; substantive and theoretical code; and probable explanations of relationships between substantive code (Montgomery and Bailey 2007: 68; Chen and Boore 2009: 2251-2260; Glaser 1998; Jones and Alony 2011: 106). Memoing is a way of keeping track of how the researcher thinks and makes sense of the information messages in data. How he or she names (codes) data incidents and conceptualisations; how code is elevated to higher levels of abstraction and how codes integrate in conceptual categories. Memos act as 'reference bank' to refer back to when new ideas and concepts emerge (Charmaz 2012: 11-12). Birks and Mills (2011: 10) aptly refer to memoing as "intellectual capital in the bank". Memos record the researcher's theoretical speculation (Montgomery and Bailey 2007: 71) which flows from findings in data analysis and gradually grow to become more interpretive and theoretical (Hood 2007: 157). According to Adolph et al (2011: 510) memoing is crucial throughout the research process because it provides an audit trail, preserves fleeting suggestions of emerging concepts, moves research forward, explains bias and acts as a source of validation excerpts and examples.

The timing of memo-writing in research application

Memoing is executed throughout the research process (Fernandez 2004: 86) and a researcher will start writing memos even before practical research actually commences or in parallel to open coding. Memoing starts this early, because, as Glaser indicates (1978: 83), memos form "the theorising write-up of ideas about code and their relationships as they [occur] to the [researcher] while coding" (Glaser 1978: 83). This definition stresses the 'as they occur' aspect to indicate that analysis should occasionally be interrupted to jot down relevant thoughts, hunches, suspicions, speculations, plausible trends, informal hypotheses (propositions) that the data and analysis suggest at any given time, before these ideas are forgotten (Montgomery and Bailey 2007: 72; Douglas 2003: 51). Interrupting analysis to reflect and memo ideas is referred to as "theoretical pacing" (Glaser 1978: 18). All memos are kept and referred to continually (during constant comparison). Apart from serving as a benchmark during constant comparisons, this cache of memos serves as a record of research decisions taken at any given time.

The format and content of memos

Memos may vary from a few words at a time to a couple of pages on a particular aspect: memos capture the meaning of assigned codes and ideas of developing theory as they occur. By saving the reasoning and thought patterns of the researcher (Montgomery and Bailey 2007: 67) at intermittent stages, conceptual coding is advanced since the researcher can "recall" and compare earlier thoughts re concepts captured in his/her memory bank and bring out or elevate conceptualisations and relationships among variables and their properties (Glaser 1978: 82). Memos are not written in a formal structured language. They reflect thought processes, thought progression and thought maturation (Barnard 2007).

Memo writing is therefore an individualistic process (Hood 2007: 157) which is analyst-dependent and can take on a format that proves effective for a particular researcher. Barnard (2007), for

example, kept three sets of memos for different memoing purposes that suited her research style. To this Glaser and Montgomery and Bailey agree (Glaser 1978; 1998; Montgomery and Bailey 2007: 71). Literature on memo-format is not prescriptive. In this regard Schreiber (2001: 71) comments that it "is far better to get the idea down on paper than lose it because of concerns about writing style". Van Niekerk and Roode (2009: 101) provide an important guideline on format when they stress the importance of preparing memos in a format that is easy to handle and to classify when memos need to be sorted (sorting of memos comes into effect in the advanced stages of analysis). These suggestions are discussed in the subsection on 'sorting memos' which follows. Because memos keep track of ideas and theory development, memo-format should be of a conceptual nature, and, because memos serve as audit trail of the research process (and thus a testimony to rigorous research), all memos should be saved in a way that eases future retrieval of information (Van Niekerk and Roode 2009: 101). Prior to research commencement a standardised format for the memo can be decided on to facilitate storage (preferably electronically) and sorting. The importance of this practicality is illustrated by the fact that Glaser (1978) - recognising the benefits of a workable memo format - initially suggested 12 pragmatic rules on memos format. He subsequently took on a more relaxed attitude towards memo rules stating that rules may inhibit conceptualisation (Glaser 1998). However, these rules act as a sound reminder that memo-format plays a part in conducting rigorous and effective research. GT practitioners recommend that researchers "pace" and record their own memos and in this way to stay in touch with their data (Jeon 2004: 253).

Memos promote an analytic and reflexive approach (Chen and Boore 2009: 2251-2260) to data conceptualisation. A reflexive approach implies abstract thinking, the interrogation of findings and development of conceptualisations (Jones and Alony 2011: 106; Chen and Boore 2009: 2251-2260; Montgomery and Bailey 2007: 69). An example of reflexive questioning of the data would ask, ''How does this named code relate to an earlier labelled concept/or incident?''; ''How does this memo compare to that memo?''; ''What is implied in these similar events?'' (Montgomery and Bailey 2007: 76). Reflection on conceptualisations and conceptualised links can be plotted as diagrams to complement memos (Lempert 2007: 259). Chen and Boore (2009: 2251-2260) refer to such diagrams as "visual memos" which often ease the process of theory consolidation – visualising the bigger picture (Montgomery and Bailey 2007: 73, 76) and adjusting as new information becomes available (Douglas 2003: 51).

In ensuring rigorous research, Montgomery and Bailey (2007: 77) stress that memos should only contribute to developing theory on the ground of the relevance of memos to the researched phenomenon: whether memo suggestions or ideations are feasible ('workable') and whether theory development – derived from memo-suggestions - fits the data (Glaser 1998). The next subsection on 'theoretical sorting of memos' indicates how conceptual codes are organised into a structure that frames the developed theory of the study.

The theoretical sorting of memos

In the advanced stages of data collection, analysis and comparison, when categories have been sufficiently elaborated on (Van Niekerk and Roode 2009:101), conceptual sorting of memos - written throughout the cyclic analysis process - commences. Theoretical sorting can be either conducted manually or electronically, depending on the specific substantive field and type of concern

investigated - but the principle of the process involved remains the same (Van Niekerk and Roode 2009: 101).

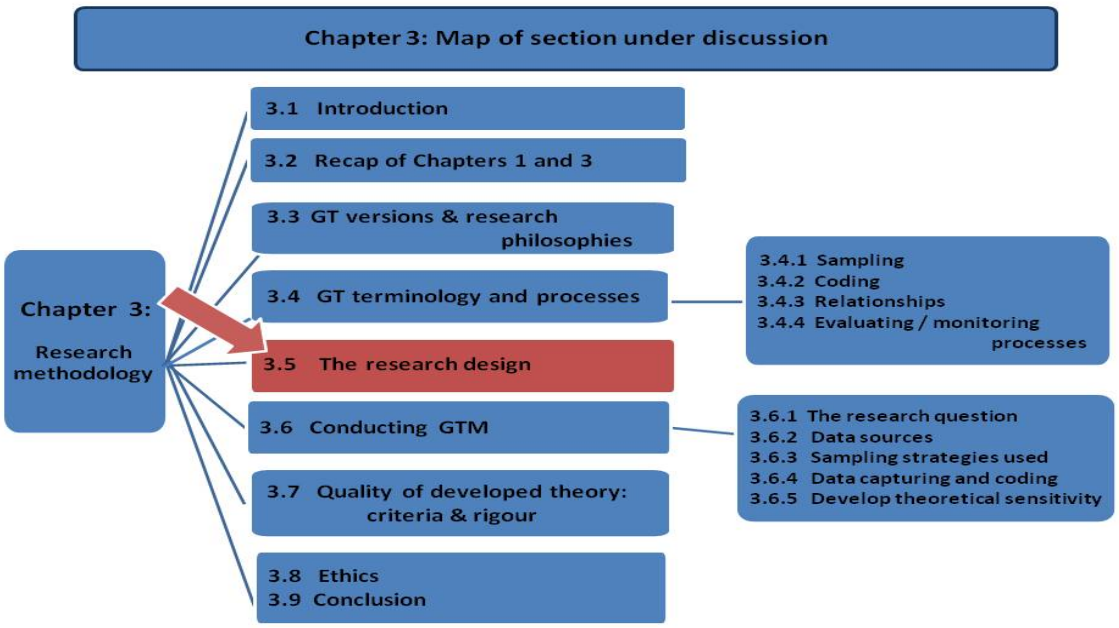
The conceptual sorting of memos is practically done by placing (sorting) memos that group under the same concept (category) into piles and subdividing (sorting) each pile according to sub-issues of the main concept (categories, subcategories, their attributes and dimensions). These sorted memos form the outline of the developing theory of the study. No pre-conceived outline is used in this sorting process: the outline is formed by sorting conceptually: per category (conceptualisation) and sub-category into orderings of similarities/dissimilarities and relationships (Adolph et al 2004: 505; Glaser and Holton 2005). Hernandez (2009: 57) indicates that in her study the majority of theoretical codes developed as part of theory formulation originated from the sorting of mature memos. This agrees with Glaser's (2005) statement that approximately 90% of theoretical code crystallises when mature memos are sorted. Sorted memos assist in structuring a theoretical, conceptual framework of a theory (Glaser 1978; Hoda et al 2011). Such a theoretical framework describes, in conceptual terms, how categories interrelate to one another and how they relate to the core category which addresses the main concern of the study (Hernandez 2009: 57). The purpose of sorting memos is to structure the outline of a theory which can then be written and presented (Adolph et al 2011:505).

What facilitates sorting?

The fact that memo sorting is executed in the advanced stages of analysis has implications for the way in which memos are physically organised: memo format and description should facilitate sorting. Whether electronically or manually sorted, Adolph et al. (2011: 505), for example, suggest arranging memos to include the date (although memos are not chronologically sorted but conceptually) and a short code of the essence of the written memo on a separate line, followed by the memo itself on subsequent lines; creating each memo on a separate page. The analogy to an electronic version is clear. Separate memos can then easily be printed for sorting purposes and placed on separate piles during sorting.

This section served to map the various processes that constitute the GT method. Sections 3.5 and 3.6 which follow will indicate how GT was implemented to explain the dynamics of *research output productivity*.

3.5 The research design of this research



Chapter 2 and 3 motivated the suitability of GT methodology for this study on the dynamics of ROP. The question that springs to mind when research design is contemplated is whether the use of GT methodology automatically classifies the research design as a *grounded theory research design*. According to Nenty (2001: 1-31) and Kennedy and Lingard (2006: 103) this is not the case. GT can be incorporated in research in many ways which impacts on the research design option for a particular study. Requirements of a study, such as research objectives, research context, methods of conducting the research, research philosophy, research question or hypothesis, data type(s), and reasoning approach all contribute towards suitable option of research design (Lacey 2006: 21).

Against this background, the research conditions that underlie this study (as per Chapters 2 and 3, and research assumptions stated in Chapter 1, Section 1.8) include the following:

- The study of *research output productivity* has been identified as an under-researched area (when viewed from the perspective of a research support statistician engaged in the research process of a research project).
- The objectives of the study include development of theory on ROP.
- Theory development for this study requires an inductive, and at time an inductive/ deductive reasoning approach, rather than a strictly deductive approach which verifies set hypotheses.
- A descriptive and explanatory approach to the research is envisaged.
- The study envisions collecting data from more than one source.
- Various data sources may be of relevance and may be sourced in this study. Sources may include observational, qualitative and quantitative data (please refer to Section 3.6.2).
- Purposive and theoretical sampling conditions.
- GT methodology (that this study intends using) requires that research execution continually builds on results of earlier execution and analysis cycles.
- Research execution proceeds in a cyclical rather than linear fashion.

- A sampling unit and an analysis unit, in this research, are not necessarily the same data entity: it is foreseen that a sampling unit sourced from a data source may yield several analysis units (e.g. a participant response regarding 'the research environment' may deliver relevant analysable units of information, e.g. 'workload'-impact, 'attitude'-impact' and 'knowledgeability'-impact). As conceptualisation and abstraction progress, the emerging concept, and no longer the original analysis unit, becomes the focus of interest of the research (Fernandez 2004: 88).
- This research is furthermore approached within a pragmatist research philosophy which resorts under a more general interpretivist mind set. (Please refer to section 1.5, Chapter 1).

The research design of this study – and thus the research methodology (Lacey 2006: 22) – has to accommodate these assumptions.

The reasoning for an appropriate research design in this section firstly argues the feasibility of a GT (i) mixed methods research design approach; the discussion then argues the viability of a (ii) case study design and (iii) reviews literature on design approaches followed by other GT researchers. This section then concludes the design-argument by motivating (iv) a classic grounded theory research design as most applicable design for this study.

(i) A mixed methods research design

The point of departure towards defining an applicable research design for this study would be to acknowledge that both quantitative and qualitative modes of investigation will be followed in this research. This complies with mixed method and GT assumptions: while GT is commonly referred to as a qualitative research approach, the original developers indicated that both quantitative and qualitative data are suited for GT application. Since it is foreseen that data will be collected from quantitative and qualitative data sources (if so required by developing theory), analysis techniques are anticipated to correspond with techniques that fit in with a mixed method research design. The option of a mixed methods research design therefore seems reasonable.

The question however remains whether a mixed methods research design is the most appropriate design. Design choice is not only determined by data collection and analysis methods but also by the context and aim of the study: According to Topping (2012: 166) qualitative data collection methods are usually less 'standardised' and structured (than quantitative methods) because these methods are sensitive to the social context and researcher-participant interaction in the research process (the person of the participant is recognised and not left out of the equation). In this study this condition has to be recognised because it is anticipated that verbalised participant responses e.g. narratives to open-ended questionnaire questions will be analysed; as well as possible follow-up communication with participants to ensure the correct conceptualisation of responses to open-ended questions (Section 3.6.2). These responses are anticipated to be less structured: they will confirm or correct interpretation if applicable. This serves as further indication that a mixed-methods research design might be an attractive option in this study. On the other hand, anticipated responses to a closed-ended questionnaire (Section 3.6.2) will be treated objectively and captured as anonymous numerical responses and analysed by means of statistical/quantitative analysis techniques (Topping 2012:165): thus a strictly quantitative data component, but still appropriate to mixed methods research approaches.

(ii) *A Case study research design*

On the other hand, a case-study research design – which is also capable of accommodating quantitative and qualitative data and analyses – also presents as an alternative design option. This option was originally considered, since research was envisioned to investigate ROP in the UNISA ODL environment. The research- and publication process of UNISA academic researchers were to be investigated – thus a case study setup. However, data sources identified as potentially relevant to the research (Section 3.6.2) includes literature - which is not specifically linked to the UNISA context - as well as research participants from other national and international HEIs (Section 3.6.2). The UNISA context has to be recognised in the study but the particular research circumstances (peer reviewers and additional statisticians could not be sourced in the UNISA environment) do not comply exclusively with a case study design. In this study case-study assumptions are not fully met: (i) data collection in case study designs is exclusively delimited by the boundaries of the case (which would be UNISA), and, (ii) the 'case' is the prime concern of the research. In this study the UNISA environment is not the prime concern of the research the focus, rather, – as will become evident towards the final stages of research - is influential factors that impact on ROP (Clarke and Reed 2012: 302; Yin 2009: 3-21). ROP factors are of concern to a greater community that the UNISA environment. Therefore, although areas of agreement with a case study research design are present in this study, the case study research design does not satisfy the methodological requirements of this study. The argument thus reverts to the option of a GT mixed methods research design.

(iii) Alternative research design options

The question of the most appropriate research design for this study is not unique. A lively debate in GT literature suggests that many GT researchers contemplate this problem. A couple of design choices of GT research reported in the literature are discussed before the decision for the most appropriate design for this study is motivated. The considerations mentioned by researchers of the undermentioned studies guided the choice of appropriate design for the ROP study.

In the discussion of their research, Johnson, McGowan and Turner (2010) for example, contemplate the applicability of a research design labelled a mixed-methods version of grounded theory (MM-GT); while (Thornberg 2012) refers to his research design as an exploratory sequential mixed-methods research design using grounded theory method. Fernandez (2003) refers to his research design as a multi-paradigm approach to grounded theory; Jick (1979) defines a triangulation design using GT methodology; and Gioia and Thomas (1996) use a two-stage mixed methods research design with a grounded theory approach. The label, two-phase quantitative-deductive/qualitative-inductive GT research design is defined by Sutton and Rafaeli (1988); and a two-phase mixed methods inductive grounded theory research design by Lösch A (2006). Many studies describe a grounded theory method research design (LaRossa 2005; Bitsch 2005; Barrett and Walsham 1999; Lehmann and Gallupe 2005; Orlikowski 1993).

An appropriate research design: The role of context and objectives

The literature on an appropriate research design for research studies that follow a GT methodology or studies that incorporate GT as a component of research execution initially seemed very confusing. Careful consideration of the research context and objectives of research undertaken in each case however indicate that research conditions and objectives specific to each research context determine appropriate design (Johnson et al 2010:71-75; Thornberg 2012; Fernandez 2003; Jick 1979, Gioia and Thomas 1996; Sutton and Rafaeli 1988; Losch 2006). This observation led the

researcher of this study to follow suit by considering the research context (as explained in introduction to this section) and the aim of this research.

Indications are that the context and aim of this research will justify a classic grounded theory research design:
(i) This research aims to develop theory in an under-researched field.
(ii) Various data sources are available to source if so required.
(iii) The research under discussion plans to explain a phenomenon by developing theory on data collected from the substantive field, to do this as an integrated research effort: not as a 'first' and 'follow-up' research-phase endeavour (therefore not a sequential-phase research approach).
(iv) The research furthermore does not plan to do a follow-up analysis with a different analysis strategy to validate or triangulate results that become available in the study (this would signify that a two-stage mixed methods research design with a GT approach or a triangulation research design using GTM would be appropriate).
(v) The role and use of analysis units in this study also comply with GT methodology: Fernandez (2004:88) points to the distinction in units of analysis in descriptive and grounded theory studies: In descriptive studies properties of the sampled units are of relevance (for example, the number of green-eyed toddlers) whereas in grounded theory studies - which aims to conceptualise towards theory development - properties of the process or conceptualisation id of relevance rather than the unit of analysis per se (for example the concept of a 'welcoming feature' can be deduced from 'a smile in the eye of a toddler'). According to Fernandez, during advanced stages of theoretical coding the initial code (e.g. 'occurrence of a green eyed toddler') may completely disappear from GTM analysis data because the initial code has been integrated holistically into a saturated concept/ category (e.g. the property of exhibiting a positive/ welcoming attitude). This applies to the research of this study. Conceptualisations will be relevant – not the data units as such.

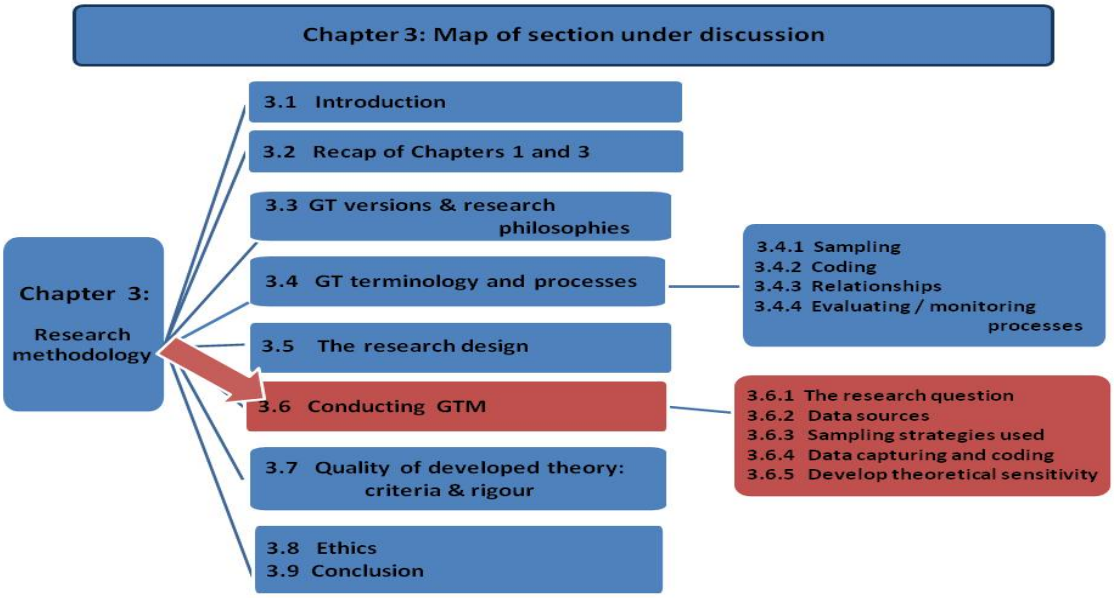
On the other hand, some research conditions listed in the introductory paragraph did not initially seem to resort under a classic grounded theory research design and warranted further consideration: should the research design label be adjusted when other statistical techniques are introduced to analyse quantitative closed-ended questionnaire results? Would survey data and 'other' statistical analysis techniques compromise the classic grounded theory design label? This was considered by questioning the purpose and timing of the envisioned closed-ended survey: for this study the purpose of survey response data would be (if GTM interim results were to indicate that open-ended questionnaire-results could be an appropriate data source at any given time in the research) to inform interim results re specific concepts or conceptualisation. Information from such a data sources would be collected and analysed concurrent to data collection and analysis from other data sources (as is typical of GT methodology). If an analysis technique was to be implemented to convert survey data to a format that serves to inform the interim GT results, this additional analysis technique (e.g. scale reliability testing and calculation of attitude scores) only serves as 'convertor of data to knowledge' and does not bring a new dimension into research implementation. Therefore implementing 'other' statistical techniques (as part of the cyclic GT collection-and-analysis process) to render data interpretable to GT progression does not compromise the appropriateness of the classic grounded theory research design option. In sum, a classic grounded theory method research design was selected as appropriate for this study.

Comment

As Van Niekerk and Roode (2009:102) point out, the inclusion of the 'classic' adjective to the design label opens up the option of investigating coding families in GT more, say, than does the Straussian GT research design that accommodates only the causal effect (6C's) coding family.

With the research design of this study explained, discussion turns to the way GT was implemented in this study.

3.6 Application of classic GTM in this study: methodological specifics



This section discusses how this study planned research to adhere to the principles of classic GT. These principles were set out in the terminology section, Section 3.4. Adherence to the underlying principles ensures the rigour of the executed research and advances true theory development.

The cyclical method of data collection-analysis-comparison that characterises GT method (Ritchie and Lewis 2003) once again reflects in the way research planning is presented in this section. Because the very nature of GT methodology makes it impossible to describe in advance the exact data sources, sample sizes and measuring instruments that will be used during research execution this section firstly reports on aspects that were considered while planning for anticipated execution needs. For example the identification of potentially relevant data sources, potentially applicable measuring instruments, and data collection methods were considered. This discussion also provides brief descriptions and references to 'as-executed' research that followed. The 'as-executed' research was directed by developing theory in the actual analysis cycles described in Chapters 4 to 5 that follow (e.g. actual data sources sampled, measuring instruments used and sample size). The discussion of Section 3.6 therefore reflects the non-linear execution style of GT methodology.

The unique way of reporting on GT execution strategy is commented on by Stern (2007: 119) who states that practical research application in GT, the "doing of the actual research", is a very individualistic process. This can be attributed to the unique thought processes of researchers in

deducing ideas and conceptualisations: each researcher will follow his/her unique way of arguing and structuring data and events to arrive at ideations. Furthermore, the variety of research topics and the unique context of research studies explain why grounded theory research is implemented and reported in unique ways by researchers. The uniqueness of implementation styles makes it imperative for researchers to describe their research-execution strategy. In this regard, Locke (2001), Ritchie and Lewis (2003), Barnard (2007) and Glaser and Strauss (1967) serve as examples of unique ways in which researchers report on research planning.

Issues that received attention in the planning phase of this study

Issues that received special attention in the planning phase of this research included the preliminary research question that directly influences initial or commencement phase sampling; the identification of potentially relevant data sources for commencement and subsequent analysis cycles; the timing of purposive and theoretical sampling; foreseeable measuring instruments; personal data coding and capturing strategy; envisioned implementation of the constant comparison technique to move conceptualisation forward; a strategy for memoing; and anticipated format of theory development.

3.6.1 The preliminary research question;

The planning of research implementation is directly dependent on the research questions of a study. Wuest (2007: 245-255) agrees that research planning and execution can only commence once the central problem of the substantive area has been identified. Section 1.6.1, Chapter 1 described the preliminary research question of the study as:

> *What factors and/ or events - associated with the research process/or within the research process - impact on research output productivity?* (as perceived from a research support statistician's perspective).

The fact that the research question is referred to a 'preliminary' in a GT investigation is linked to the fact that information and knowledge of the to-be-investigated research topic is still vague when research commences. Wuest (2007: 245-255) comments that the research question of a GT study can only be refined once the core category of developing theory starts to emerge towards the more advanced cycles of research implementation. The core category naturally then serves to describe the research topic and research question more accurately. The preliminary nature of the research question and topic was motivated in Section 1.6.1. The literature review of Section 2.6.2.1 in Chapter 2 defined the research topic of this study as *research output productivity.* The context of this research was also elaborated on in Section 1.3 of Chapter 1 and highlighted the critical space that the research process occupies in producing research findings to enable academic publishing; and the vantage point of this research, namely that of a research support statistician/statistical community involved in the research process. The substantive area of research could in this way be delimited to events and circumstances within, and related to, the research process that could impact on the publication of academic research in accredited journals.

3.6.2 Identification of data sources that could be of relevance to the research

Attention turns now to data sources that could potentially be of relevance to this study once clarity on the research topic, research question and initially demarcated substantive area have been reached.

Unlike conventional research methodologies where data source/s, sampling strategy, sample size and sample are predetermined parameters set in the planning phase, grounded theory's inductive nature calls for data to be progressively sourced as required to facilitate theory development in collection-analysis-comparison cycles. In the planning phase, data sources that could possibly be of relevance to the research are identified in advance. The fact that classic GT abides by the principle that "all is data" offers a flexible angle to sources that can be considered (Glaser 1998: 8). Data sources identified for this study are listed in the next paragraph. The listed sources were evaluated against guidelines offered in the literature and concern the usefulness, suitability and sufficiency of sources (Charmaz 2012: 18-19); the suitability of data sources to serve as commencement source (Glaser 1978: 45-46); rich and substantial data that are of relevance to the substantive research area (Charmaz 2012: 18); the diversity and variety of data sources that should receive attention (Glaser and Strauss 1967; Holloway and Todres 2012: 195; Egan 2002); sources that should be considered in stimulating theory development (Stern 2007: 116; Wuest 2007: 243); sources that are intriguing and stimulate contrasting responses from participants (Egan 2002: 283); data that encourages comparison (Egan 2002: 283); data sources that inform the researched phenomenon (Egan 2002: 277-295); and data that can deliver sufficient sample sizes (Charmaz 2012: 18; Glaser 1998; Stern 2007: 117). Against these guidelines, the following sources were identified as potentially useful and available ROP sources for this study (to be accessed if and as required by ongoing research implementation):

3.6.2.1 The literature as data source: the introductory review as commencement source and additional literature

Pandit (1996) and Lösch (2006) both indicate that the initial literature reviews of their research served as excellent departure point for practical GT research implementation - their commencement phase data sources. In their quest to identify knowledge gaps in their respective fields, their literature reviews were rich, enabling them to identify knowledge gaps and also offered ample suggestions of emerging conceptualisations in their substantive research areas. These suggestions of concepts served as impetus to begin their studies and indicated subsequent relevant sources to be sampled in continuing analysis cycles.

The experiences of the above-mentioned researchers triggered the idea of using the introductory literature review of this study as commencement phase data source. The motivation to this effect is set out in Chapter 4. Section 4.2 will indicate that the decision was based on the fact that the initial literature review uncovered – apart from a knowledge gap - a wide range of events and actions that concern the production of research findings and the publication of such findings.

When consideration was given to the literature are possible data source (and commencement source) it was also reasoned that in interim and advance cycles of analysis the literature could furthermore serve to inform and in advanced analysis cycles verify abstractions of

conceptualisations. It will be indicated in Chapter 4 and 5 that additional literature (the integrated-into-text literature review outlined in Chapter 2) did serve as data source to this study.

3.6.2.2 Data source: the responses of academic researchers and other role players collected via an open-ended questionnaire

In the planning stage of research, the argument was made that the input of academic researchers and/or other groups involved in producing and publishing academic research articles could be regarded as a potentially relevant data source to theory advancement on ROP. Responses of academic researchers (and possibly other groups with ties to academic publishing) thus presented as a possible relevant data source. It was argued that topics of relevance to ROP were the perceptions of researchers on issues related to the research process[51]; the perceptions of other role players re their contribution to the research process; and the process of article write-up and submission. The argument was taken further by asking how the response data source should be sampled. Interviews present as one option and written responses to a to-be-designed open-ended questionnaire (if theory development so require) as another. Mentioned questionnaires can be completed by researchers and other role players. Open-ended questionnaires present as an attractive measuring- and data collection instrument because the exact words of research participants are captured in this way. Possible bias that can be brought into this study when recording interview data can be countered in written participant-responses to open-ended questionnaires.

Chapter 4 will indicate that the responses of academic researchers and other role players were indeed used as data sources in continued analysis cycles. Chapter 4 will motivate that theory emergence indicated that the input of academic researchers, managers and support statisticians in the early cycles of analysis were required to densify suggestions of concepts with additional simple events, and in other cases, inform emerging conceptualisations. Early in the research the perceptions of a broad spectrum of parties with interest in the research process and publication of research findings were sought. Chapter 4 details how the open-ended questionnaire was designed to address the knowledge-need for a broad spectrum of responses[52].

3.6.2.3 Data source: the responses of academic researchers and other role players collected via a closed-ended questionnaire

To drive theory emergence towards the level of a substantive theory it was argued that input of academic researchers and possibly other role players could possibly be required in more advanced cycles of collection-analysis-comparison as well. Further information needs would most probably concern more specific information to densify, clarify and refine already identified conceptualisations and categories and also to stimulate abstraction. It was argued that if additional input from academics or other interest groups was required, the need would arise towards the more advanced stages of analysis and theory development. The type of information required would most probably query specific aspects of theory development. Response-data could possibly then be sourced more selectively by means of a to-be-designed closed-ended questionnaire - if theory development so

[51] The research process is of relevance because this process produces research findings which can then be reported in articles submitted for publication.

[52] The cyclical nature of GT research execution and a linear report style are accommodated in this section of potential data sources: the planning stage of GT method cannot provide a detail list of data sources to be used in research. It can, however list potential sources and then, in retrospect, indicate which sources were used in actual research execution - therefore the 'anticipated' and 'as-executed' description.

indicated. It was anticipated that information would be required on detailed aspects and that a closed-ended questionnaire that queried specific aspects would be best suited. It was again reasoned that written questionnaire responses would counteract bias in capturing interview responses should this means of data collection (interviews) be considered.

Section 5 in Chapter 5 indicates that the ongoing input of academic researchers was required and that their responses would be used as data source in the advanced cycles of data collection-analysis-comparison. Theory development indicated the need for more detail on areas of uncertainty which the input from academic researchers could supply. As opposed to the open-ended questionnaire responses in the earlier cycles of data sourcing, data sampling in the advanced cycles of analysis was delimited to academic researchers and support statisticians and did not ask further input from managers. The data source of responses thus represented a more delimited and specific set of responses. Chapter 5 discusses how the closed-ended questionnaire was designed to address these specific knowledge needs.

3.6.2.4 Data source: informal field notes on research-process activities of academic researchers captured by the researcher of this study

Observations were recorded by this researcher as a research support statistician following consultation sessions with academic researchers of UNISA in the planning and execution of their registered UNISA research projects. Field notes consisted of written statistical reports, statistical contributions to articles submitted for publication, e-mails and records of research process activities and queries made during/after consultation sessions. These notes include interesting, noteworthy or intriguing events encountered. The noted observations focused on events perceived to affect research quality, the research process and the overall acceptability of research findings submitted for publication to accredited journals.

Chapter 4 and 5 refer to events and circumstances in the field notes that proved to be of relevance to this study. This data source was therefore used in research implementation when theory development required such input.

3.6.2.5 Data source: events of relevance associated with a set of published articles that the researcher of this thesis co-authored

Consideration of potentially relevant data sources also included incidents and events associated with a set of 34 articles that this researcher co-authored. The researcher was included as co-author because of the substantial statistical support provided to produce research findings and to publish the results (statistical consultation, analysis and interpretation, and write-up/editing of the statistical component of the research). Working notes that reflect events that impacted publication rate are available.

Consideration was initially given to include references to these articles in an appendix to this chapter. However to protect researcher anonymity and confidentiality this route was not followed (UNISA Ethics Policy 2012). It was argued that if in the execution of the research a need arose to mention events in this data source, the specific event should be included (with due consideration to anonymity) and reference should be the article-set in general. Permission was obtained from all article first-authors if events related to their research were included in this way.

3.6.2.6 Data source: researcher and role players' recorded responses to follow-up discussions and interviews; and informal discussions

If theory development indicated a need for input from researchers and other role players (open- and closed-ended questionnaire), it was furthermore reasoned that additional feedback, in more advanced analysis cycles, would possibly be required from these respondents to verify that the researcher of this study correctly interpreted emerging concepts and relationships that arose from the original respondent input. Follow-up responses from academic researchers and other role players therefore also constituted a potential data source. Data from this source could be sourced in follow-up discussions with academic researchers and role players and also in informal discussions as and when they occur. Reference to such incidences in Chapter 5 indicates that this data source was also used, but to a lesser extent.

3.6.3 Sampling strategy and data capturing protocol

Apart from the identification of potential data sources that could be of relevance to this study, sampling concerns had to be addressed in the research implementation strategy. Concerns focused on the extent of initial and continued sampling (the substantive area); sampling techniques; sampling units; sample size; and timing of sampling techniques. These concerns are discussed in the next subsections.

3.6.3.1 Extent of sampling and sampling technique

In initial sampling, grounded theory method collects data from a broad substantive area with the intent of including numerous data events that cover a wide range of issues linked to the research topic. In this way numerous aspects and concepts of ROP are introduced into the investigation. Wuest (2007: 245-255) agrees with this broad sampling approach. Furthermore, when research commences and no theory development has occurred to suggest a relevant data source to sample (that will stimulate and inform further theory development), theoretical sampling cannot be applied. How to sample in this instance? The data source that seems most appropriate to the researcher should then be sampled purposively and should be sampled to include instances of many aspects of the researched phenomenon.

The description of the commencement phase of this study (please refer to Chapter 4, Section 4.2) will indicate that data was sampled purposively from literature reviewed in the introductory literature review of this study. This source proved to be a very rich source of information on numerous events related to research output, productivity, article publication, the editorial process, management and institutional interest, the research process, role players, environments and conditions that all suggest impacting effects on the publication of research findings in DHET accredited journals[53].

The discussion of theoretical sampling terminology in Section 3.4.1.3 explained that theoretical sampling comes into effect when conceptualisations and abstractions emerge from the data and specific aspects of substantive code and categories need clarification. This implies that sampling becomes focused and specific. Theory development determines which source and concern to

[53] Events were not restricted to research output in DHET accredited journals but included a broader field: national and international research and research output.

address. Chapters 4 and 5 describe how the data sources (literature; responses from researchers and other role players; field notes; the set of published articles) were theoretically sampled in different ways (open and closed-ended questionnaires, notes recorded of informal discussions, field notes, etc.) to provide the required additional information in the cycles of data collection, analysis and constant comparison in continued research execution.

3.6.3.2 Sampling units

In this study sampling units were anticipated to constitute either people, e.g. academic researchers, institutional managers, consulting statisticians, journal editors, peer reviewers or language reviewers; or documents, e.g. the literature, field notes, working papers and notes; or a set of co-authored published articles, depending on the information need and source developing theory require. If the data source consists of literature this study assumes that articles, books, web references, conference proceedings, and dissertations are included. Sampling units of interest when field notes or the mentioned set of published articles are indicated will be individual observational notes or specific articles.

3.6.4 A strategy for coding, capturing and constant comparison during research implementation and envisioned memo-structure

How the coding, capturing and comparison of sourced data would be practically structured in this research had to be carefully considered. The following actions were anticipated:

3.6.4.1 Units of analysis

In initial data collection-analysis-comparison cycles the approach of this study was to regard simple events, or actions, or conditions collected from a data source as analysis units. In other words, simple events, and not word-by-word or line-by-line text or participant responses (depending on the data source sampled at a particular stage) would constitute analysis units. For example, if literature was to be sourced, phrases such as, '*a researcher that is well informed in this subject field';* and *'up-to-date with the latest developments in his/her field'* will constitute units of analysis for coding because these phrases describe simple events/attributes of the knowledgeability of the researcher. Table 3.3 lists three units of analysis.

Table 3.3: Examples of analysis units or simple data events

Elementary data unit	Open code
'A researcher that is well informed in this subject field'	
'A researcher that is up-to-date with subject-specific developments'	
'Ability to formulate research findings'	

3.6.4.2 Coding open or initial code

Sourced data is split into analysis units to enable open coding. For this study it was decided that the coding strategy would be to code each analysis unit or sets of analysis units (should events for example be sampled from the literature as data source at a particular stage) immediately when sourced and use an abbreviated or short description of the event as 'open code' for the event. For example, the two events listed in Section 3.6.4.1 can be abbreviated/ coded as 'researcher's subject knowledgeability' (Table 3.4).

Table 3.4: Examples of open code for simple data events/ or analysis units

Elementary data unit	Open code
'A researcher that is well informed in this subject field'	Researcher's subject knowledgeability
'A researcher hat is up-to-date with subject-specific developments'	Researcher's subject knowledgeability
'Ability to formulate research findings'	Writing skills

3.6.4.3 Electronic capturing of open code: a coding system and constant comparison

The issue of how open code should be systematically captured and saved also required consideration. It was decided that the open code should be captured electronically while coding to ensure that information was not lost or forgotten in the coding process. It was anticipated that the volume of open code would be substantial (especially in commencement cycles of the research when most of the open coding would be undertaken) and that open coding would be done swiftly – as advised by Charmaz (2012). Code would be captured in Excel. This decision was taken because Excel data fields are well structured, easy to update and manage, and can easily be imported to the SAS[54] platform, the statistical analysis software package this research intended to use for data analysis and constant comparison.

Data capturing to Excel had to provide for several different data fields:

- The link to the original source that data was collected from. Links to such sources had to be preserved to ensure the rigour of the research and enable 'back-reference' if the coding process had to refer back to original data events
- The analysis unit or simple event sampled
- The initial code for the event, the open code
- Provision for data fields that record continued conceptualisation and abstraction of theory development
  - conceptual/ substantive code
  - further abstraction and suggestion of a category
  - Categories
  - Dimensions of categories
  - Core category
  - Suggested relationships

It was envisioned that if open code – when open coding was conducted – triggered ideations of concepts, abstractions, categories and relationships, additional fields of the above-mentioned data fields would be populated in conjunction with open coding. Otherwise these fields would be left blank until further sampling; coding and comparison enriched the particular concept and suggested more abstract conceptualisations. It was also anticipated that not all higher-order code fields for every open code event would necessarily be populated. This assumption was based on Fernandez's (2004) comment that in GT analysis the initial 'data', namely the open code, is not the focus of GT data analysis but rather the concepts, categories and relationships that evolve from the initially coded data. Therefore focus will gradually move away from the open code towards conceptualisations (which will naturally be a smaller set of concepts) suggested by sets of open code (or even single-event open code).

[54] SAS software: SAS version 9.2, 'Statistical Analysis System' software package, is a statistical software package the researcher of this study intended to use to analyse captured data

In subsequent planning, research had to consider how constant comparison would practically be implemented to achieve conceptualisation and abstraction - the primary concern of GT methodology (Fernandez 2004; Munhall 2007: 249—262). It was foreseen that constant comparison would take on several formats in this study:
(i) Open-code-to-open-code comparison could be conducted by physically studying and comparing open code events on printed lists of code captured up to any specific point, and then populating higher order conceptual fields as ideas form.
(ii) The Excel file of open code could, at any given time, be imported to the SAS platform and sorted in various ways on open code: for example alphabetically or according to catch-phrases in open code. The lists can then be printed and compared – once again to stimulate conceptualisation and theory development.

It is further anticipated that once data fields for higher order substantive code have been reasonably populated, the above mentioned procedure can be conducted on substantive-to-substantive code comparison (as well as open-code-to-substantive-code comparison). Comparison at this stage would involve less material and comparisons and more information could then be theoretically sampled from data sources that would densify specific aspects of evolving theory.

Table 3.5 shows an excerpt from an Excel coding spreadsheet that was compiled in the early cycles of analysis execution when literature was used as data source. This is detailed in Chapter 4 to follow. As more information became available and insight in the data grew, the levels of substantive code (the substantive code data fields) were continually revisited and updated. Chapter 4 reports on how substantive data field in the Excel file was populated from the literature that was used in the introductory literature review of this study. In total 828 analysis units (simple events) were incorporated in this coding file.

Table 3.5: Example of coding template used for electronic capturing/ comparison of code

Obs	ref	IncidentsThat AffectROP	OpenCode	SubstantiveCode	SuggestionOf Category	Dimension	Broad Category	dimension	RelationCoreCategory
1	Shin&Cummings, 2010	Disciplines' output rate differ	DepartmentDiscipline	DepartmentImpact	DepartmentImpact	Discipline Dynamics	Environments	department	DeptDynamicsInGreaterEnv
2	Shin&Cummings, 2010	department Research preference	DepartmentResearchPreference	DepartmentImpact	DepartmentImpact	Research Preference	Environments	department	DeptDynamicsInGreaterEnv
9	Shin&Cummings, 2010	Personal preference for Research	ResearcherReseachPreference	Researcher Preference	Preference	Research Preference	Environments	research	
10	Shin&Cummings, 2010	personal ability do Research	AbilityResearcherDoResearch	ResearcherSkills	Skills	AbilityDoResearch	Environments	research	
3	Shin&Cummings, 2010	time on Research	Research Time	DepartmentImpact	DepartmentImpact	Time Allocation	Environments	department	
4	Shin&Cummings, 2010	Department collaboration with peers	DepartmentCollaboration	DepartmentImpact	DepartmentImpact	Collaboration Research	Environments	department	
12	Shin&Cummings, 2010	Researcher:academic rank	ResearcherAcademicPosition	Biographical Researcher	Biographical	AcademicPosition	Environments	research	
13	Shin&Cummings, 2010	Researcher gender	ResearcherGender	Biographical Researcher	Biographical	Gender	Researcher	Biographics	
14	Shin&Cummings, 2010	Researcher marital status	ResearcherMarital	Biographical Researcher	Biographical	Marital	Researcher	Biographics	
15	Shin&Cummings, 2010	Researcher dependents	ResearcherDependents	Biographical Researcher	Biographical	Dependents	Researcher	Biographics	

The format of electronic capturing of research role players' responses to open-and closed-ended questionnaire (if information from these data sources are deemed necessary)

It was anticipated that the format of electronically captured responses from researchers and other role players in open- and closed-ended questionnaires would differ from the above description of the literature review data source (and, if applicable, accounts of informal discussions and interviews). It was argued that questionnaires – if research progression so required – would target more specific conceptualisations that required clarification and would not cover such a broad theory-development area as commencement phase data capturing. Chapter 4 and 5 will indicate that this was indeed the case.

3.6.4.4 The anticipated format of memos for this research

The way memos would be recorded in this research was also contemplated in the planning phase. It was foreseen that memos would play an important role during data collection in providing a means of capturing 'fleeting' ideas of possible suggested categories; category attributes; and links between categories. Furthermore, it was argued that memos would provide a means of keeping track of the research implementation 'history': the time the data source was suggested by emerging conceptualisations; why and when data sources were used; and how data were collected from these sources. It was decided to structure a simple four column table in MSWord and report ideas as and when they occurred and seemed important during research implementation. Table 3.6 illustrates the format of the envisioned memo format[55]:

Table 3.6: Envisioned format of memos during research execution (with an imaginary example)

Audit trail/ or memo	What triggered the idea? (keep track)	Summary reference: Category/ concept	Date
Is writing skills, namely how well the author expresses him/ herself, a dimension of researcher skills category?	Shin & Cummings (2010) article – many articles refer to importance of thought expression: ability to express this	Researcher skills	15-03-14
ROP: Suddenly web searches on research productivity, research proficiency and research production got me worried about terminology: all produce research findings, but *how* it is produced becomes another aspect: speed/ efficiency … etc. …	Chapter 2 (preparing Appendix of lit searches): ROP: seems as though 'P' in ROP should be 'productivity' not 'proficiency' or 'production'? … etc. /…	Terminology of ROP … etc. ….	16-11-2013

While planning research execution it was furthermore argued that each memo entry could be easily printed on a separate page (with ample space for additional comments) and used in theoretical sorting exercises in the advanced cycles of GT analyses. In this way the memos could be incorporated in theory write-up. In the actual analysis, described in Chapter 5, the memo sorting seemed confusing and tedious when sorting commenced but gradually fell into place once theory was mapped in rough hand-drawn diagrams – these diagrams eventually evolved into a logical way of expressing theory development. The diagrams became a focal point of analysis and culminated in a diagrammatic explanation of the theory of ROP. Translating the diagram into words proved an effective way of describing the developing theory (Figures 3.3 to 3.8 in this chapter; Figures 4.1 and 4.5 in Chapter 4; Figures 5.2 and 5.4 in Chapter 5; and Figures 6.2 to 6.5 In Chapter 6).

[55] This format was indeed used to capture memos electronically.

This section briefly explained how data capturing and coding was to be managed in the collection, analysis and comparison cycles. During research execution the value of the planning exercise became apparent: the amount of data and open code required to advance theory progression (towards conceptual code) proved to be voluminous. If a coding and capturing strategy had not been in place when research commenced huge amounts of data could easily have been 'overlooked' and forgotten purely because of the extent of the practical analysis.

3.6.5 Building theoretical sensitivity

The ability of a researcher to recognise messages in collected data is central to successful theory development. A sensitive theoretical eye will recognise and investigate conceptualisations and relationships further. In this regard Charmaz (2012: 135), amongst others, emphasises the fact that knowledge of many theories builds theoretical sensitivity. Theory-knowledgeability eases recognition of theory components, theory compilation and theory description. Theory development therefore assumes knowledge of the underlying components of theory and how such components can be integrated and expressed as a developing/developed theory.

Theoretical sensitivity develops in an environment where exposure to diverse theories[56] is encountered. To this end, literature on theory structure and various theories was consulted as is evident in the reference list of this thesis. Examples include the theoretical coding families of Glaser (1978); the element and components of a theory (Creswell 2009: 49-71); Whetten's building blocks of theory and how it links to GT (Whetten 1989); and Bryant's discussion on pragmatism and theory (2009: 349). In "Reconstructing theory" Charmaz discusses examples of theory building based on different philosophical paradigms (2012: 123–218); Jungnickel (1990) discusses research productivity in different departments of pharmaceutical schools; Koen (2007) discusses research on theory development of students' throughput and retention; Subotzky and Prinsloo (2011), Swanepoel, Subotzky, Van Schoor, Prinsloo and Botha (2011), and Archer, Chetty and Prinsloo (2014) work on a socio-critical theoretical model for student success; and Elliot and Higgens (2012) in turn explain how Elliot developed theory on clinical decision making in advanced nursing practice, and Higgens explains theory development on sexuality and mental health in nursing. Exposure to these works proved invaluable throughout research implementation.

3.6.6 A schematic summary of actual research progression

Sections 3.6.1 to 3.6.4 outlined the anticipated implementation strategy for this research. These sections could however not include the actual 'as-conducted' planning cycles as would be applicable in the methodology chapter of more conventional research approaches. The reason for this is that each subsequent execution cycle in GT is dependent on theory development from previous cycles which dictates the relevant data source from which to sample information in the following analysis cycle and so inform evolving theory. The choice of data sources and the sequence of data sources actually sampled therefore only become 'known' when preceding cycles have progressed substantially. As mentioned previously, this property affects the chronological presentation of a non-linear cyclical process. Therefore a schematic 'as-conducted' implementation strategy is presented in this section. This section could therefore only be added to Chapter 3 once the bulk of the practical

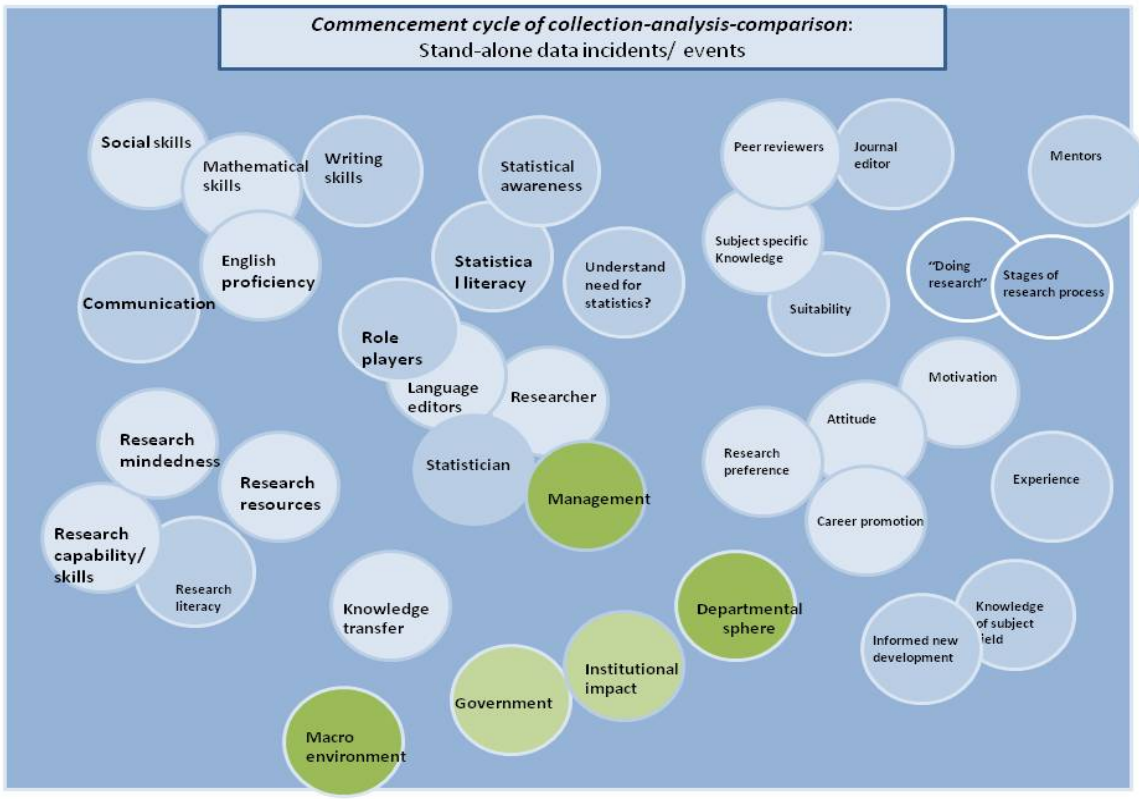
[56] In GT this applies to areas of research not directly related with the research topic

analysis cycles described in Chapter 4 to 6 had progressed considerably. It was however argued that inclusion of the 'as-conducted' execution strategy in the methodology chapter would introduce the research reporting framework of Chapters 4 to 6. The actual motivation, application, data analyses, comparisons and research findings are discussed in Chapters 4 and 5 and the ROP modelling in Chapter 6.

3.6.6.1 The commencement cycle of research (sources: initial literature review, memos)

Chapter 4 will indicate that the literature served as commencement data source in this study. The introductory literature review reported in Section 2.6 of Chapter 2 proved to be a good starting point for research execution. Chapter 4 motivates this action by indicating that the review not only identified *research output productivity* as a knowledge gap but also provided a wealth of additional information on issues and events that (have the potential to, or) affect the research process and production of research findings. The production of research findings in turn impacts on ROP. Because limited theory on ROP has been reported in literature – especially from the vantage point of this research - the risk of bias-introduction to theory development[57] is considered low. The literature review thus offered, as a 'by-product', an extensive list of data events or incidents that could serve as analysis units in initial GT analysis. In this way a practical starting point for initial coding could be identified. A schematic illustration of theory progression in the initial analysis cycles – with examples of early conceptualisations re included for illustrative purposes (Figure 3.3). The detailed discussion of data collection, coding and results interpretation is given in Chapter 4.

Figure 3.3 Literature provides a first indication of various data incident that relate to ROP

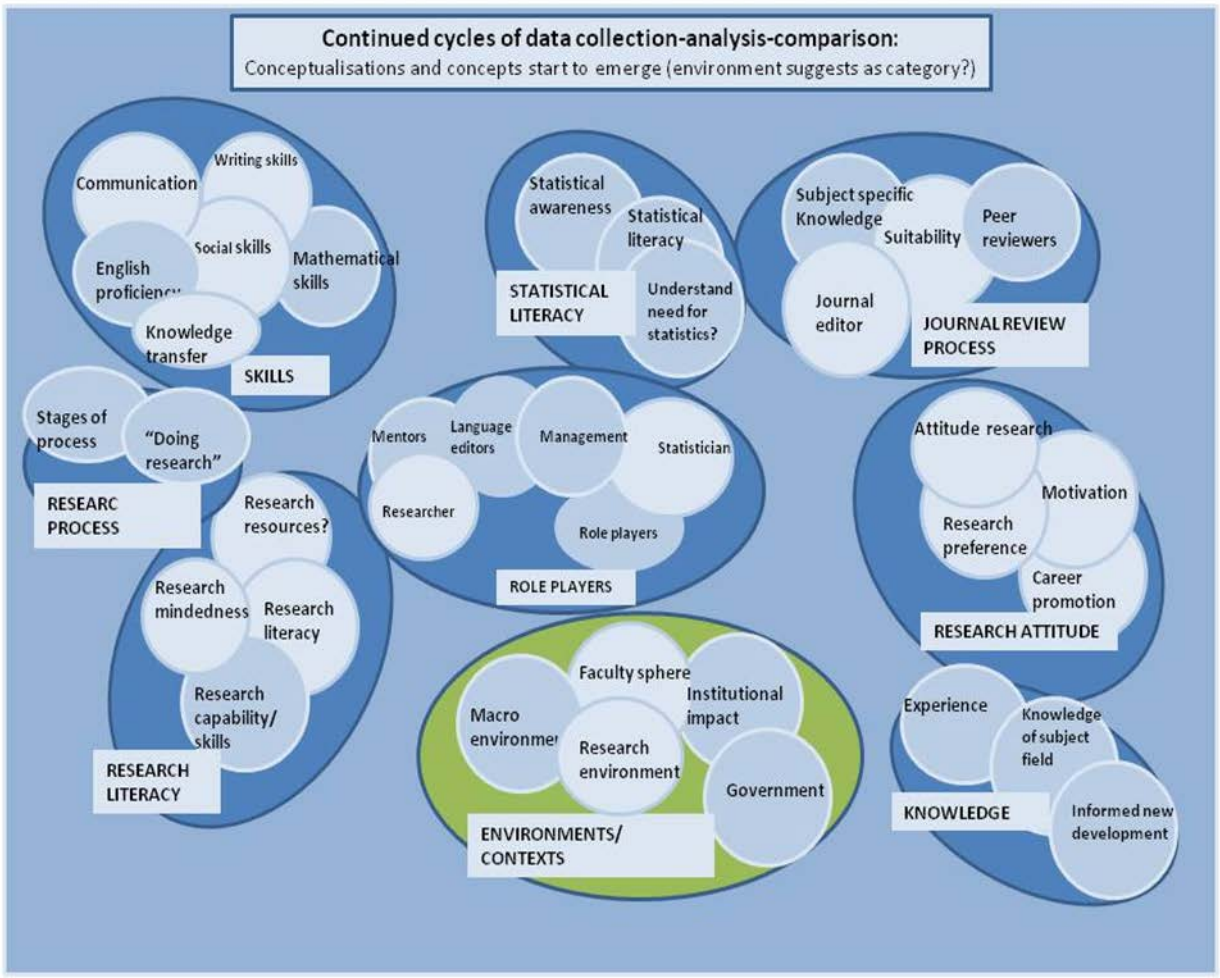


[57] Glaser's dictum to avoid the literature in early cycles of GT analysis originated from a concern that knowledge gained from the literature can influence theory development. If theory on the phenomenon being researched is however limited, the possibility of the literature influencing theory development is very low.

3.6.6.2 *Continued cycles cluster data events that suggest higher levels of abstraction (sources: literature review, field notes, memos)*

Conceptualisations and suggestions of concepts emerged from continued cycles of data collection analysis and constant comparison of open code and open- and conceptual code (Section 3.6.4. and 3.6.4.3). The value of constant comparison in moving conceptualisation forward proved invaluable in these cycles. Figure 3.4 illustrates how concepts started to emerge from clusters of data events. A few examples of higher levels of abstractions (which begin to suggest categories) are included for illustrative purposes. Chapter 4 details the development.

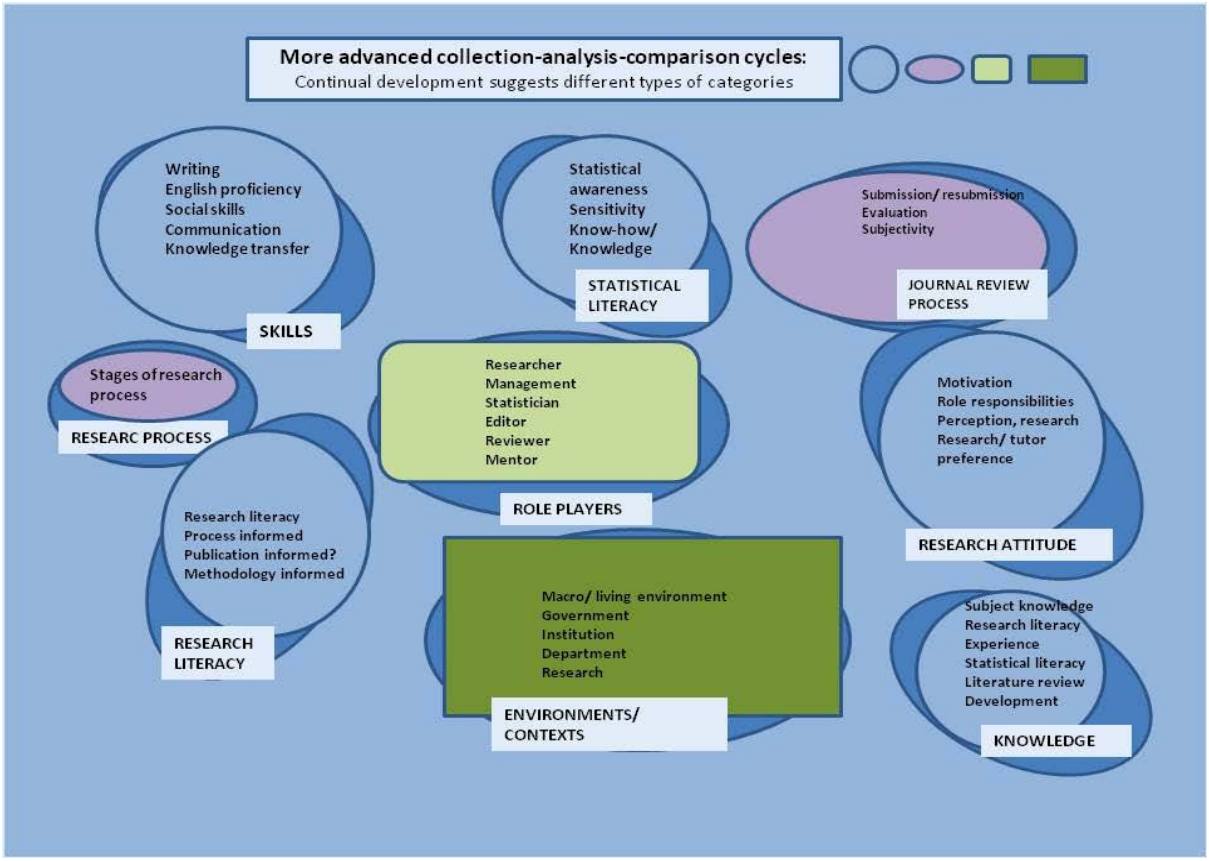
Figure 3.4 Initial code and clusters of initial code begin to suggest conceptualisations



3.6.6.3 *Substantive code elevated to category identification and densification (sources: literature review; open-ended questionnaire responses, field notes, memos)*

In continued analysis cycles theory development indicated that information was required from an additional data source. The source constituted the responses of academic researchers and other role players (managers, journal editors and reviewers, research support statisticians) to an open-ended questionnaire. Additional information on more specific issues of emerging conceptualisations and categories were required to verify, densify and clarify categories and still emerging concepts and higher levels of substantive code. A category of particular concern was a suggested environment category. The suggestion of different types of categories also required further investigation. Figure 3.5 illustrates how densification advanced theory development by verifying an environment category and identifying category-types: e.g. a 'processes' category, 'environment or context' category and 'role players' category. Chapter 4, details these analysis cycles.

Figures 3.5 Different types of categories develop, including an environment category



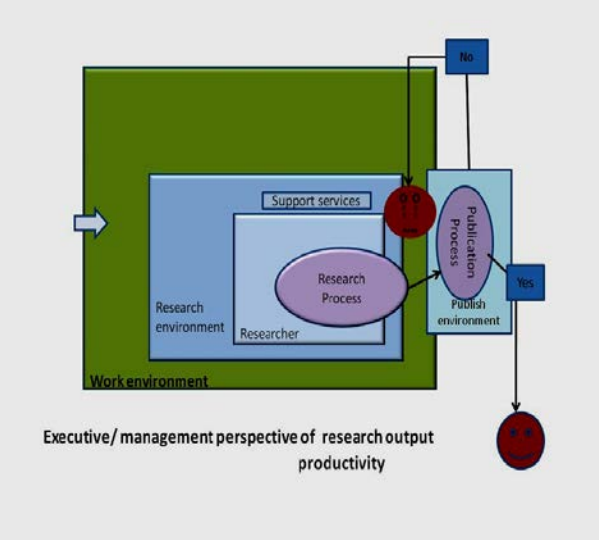
3.6.6.4 *Refinement of the environment category indicates that different environments affect perception of ROP dynamics (source: open-ended questionnaire responses, literature; memos; field notes)*

Figures 3.6 illustrates how information sourced from academic researchers and a broad range of role players advanced theory progression by suggesting the importance of an environment category and the impact of a vantage point (specific environment) on perceptions of ROP. For example, managers in an institutional environment will consider research output productivity from a different vantage point (and interest in ROP) than academic researchers who are more closely involved in the

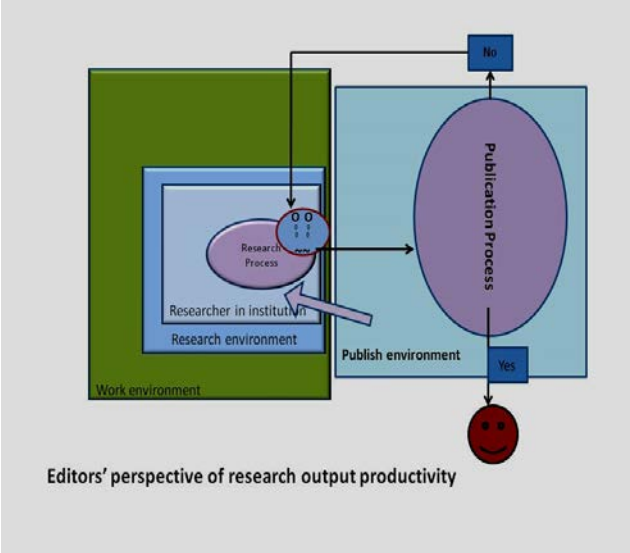
production of research and the publication thereof. To a manager in the institutional environment, ROP constitutes one of several functionalities of the institution (e.g. human resources, student registration, academic departments, etc. as well as research). As such, research productivity, efficiency, promotional and financial value and proper functioning of research will most probably be the vantage point from which ROP is evaluated. The vantage point perspective is detailed in research execution steps reported in Chapter 4.

Figure 3.6 Environment impacts perceptions of the dynamics of the research process and ROP

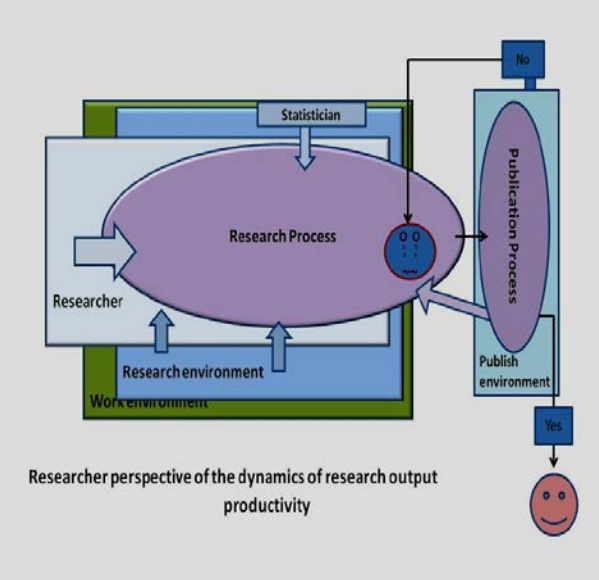
***Institutional manager's perspective*:**
Institutional environment regards research environment as one of several institutional functions (e.g. tutoring, student affairs, exams, research)



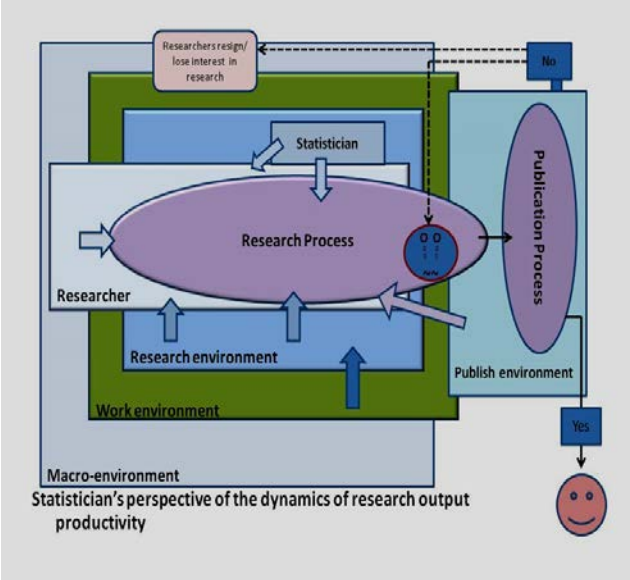
***Editor/ peer reviewer's perspective*:**
Editorial environment perceives reviewing as components of managing a quality, prestigious journal – 'producing' the article is not the issue (research process) – quality and appropriateness for journal vision is important



Researcher perspective:
Researcher is concerned with the direct world of "doing the research" – the greater environment picture is only important in how far it affects research conditions.



Support statistician perspective:
The statistician's concern centres around quality and accuracy of the research process – and accuracy in reporting findings

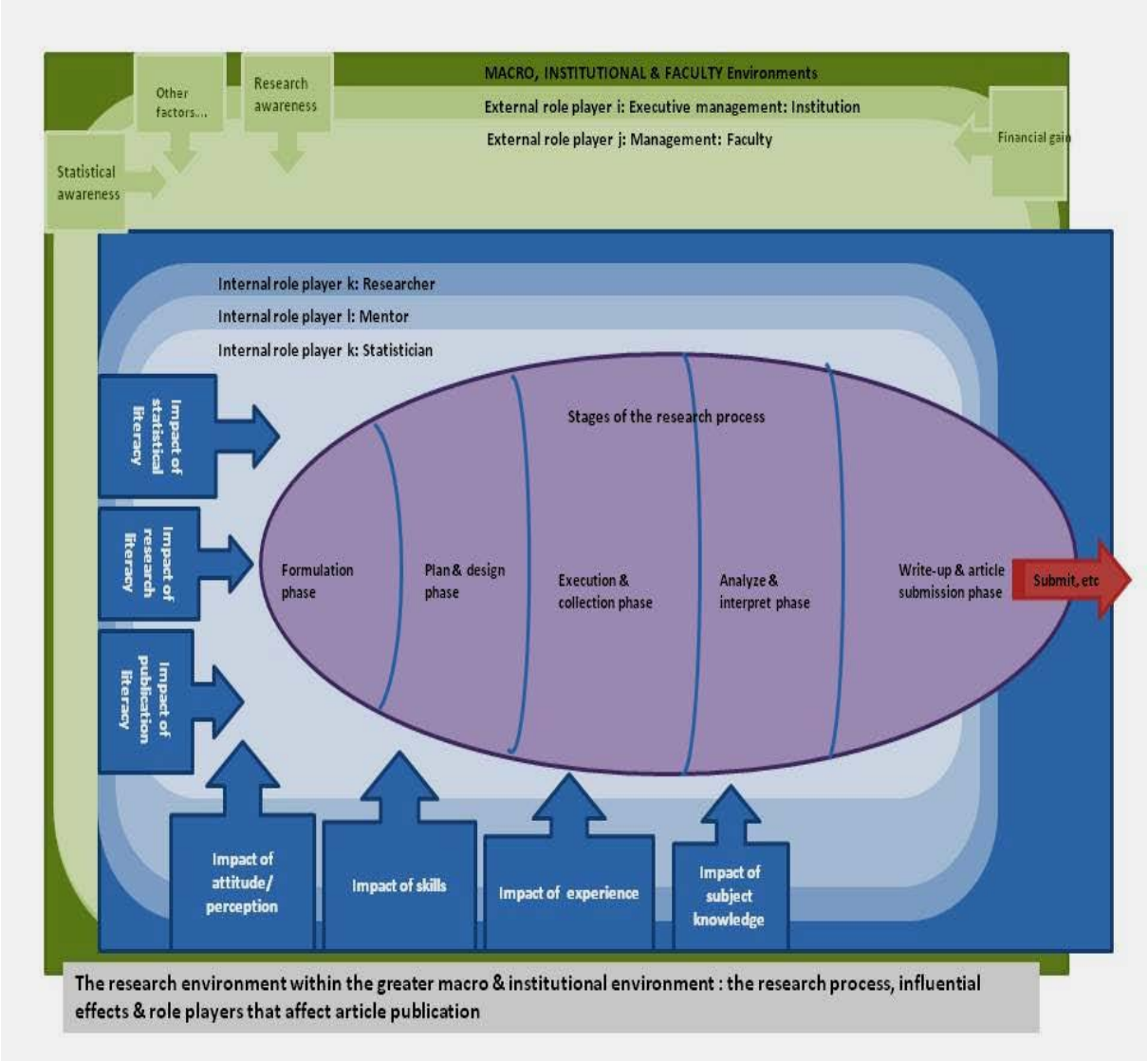


3.6.6.5 Theory development: modelling ROP in a researcher-environment delimited substantive area (sources: responses to a closed-ended questionnaire; literature; memos; field notes; set of co-authored articles)

In the advance cycles of analysis responses of academic researcher and support statisticians formed the data source and responses were sourced by means of a closed-ended questionnaire. Theory development in advanced cycles of analysis required input from researchers and research support statisticians directly involved in article production. Information collected via a closed-ended questionnaire served to clarify and enrich categories, verify the research process as core category and refine relational links between the core category and other categories. The collection, analysis and comparison cycles and ensuing findings are detailed in Chapter 5.

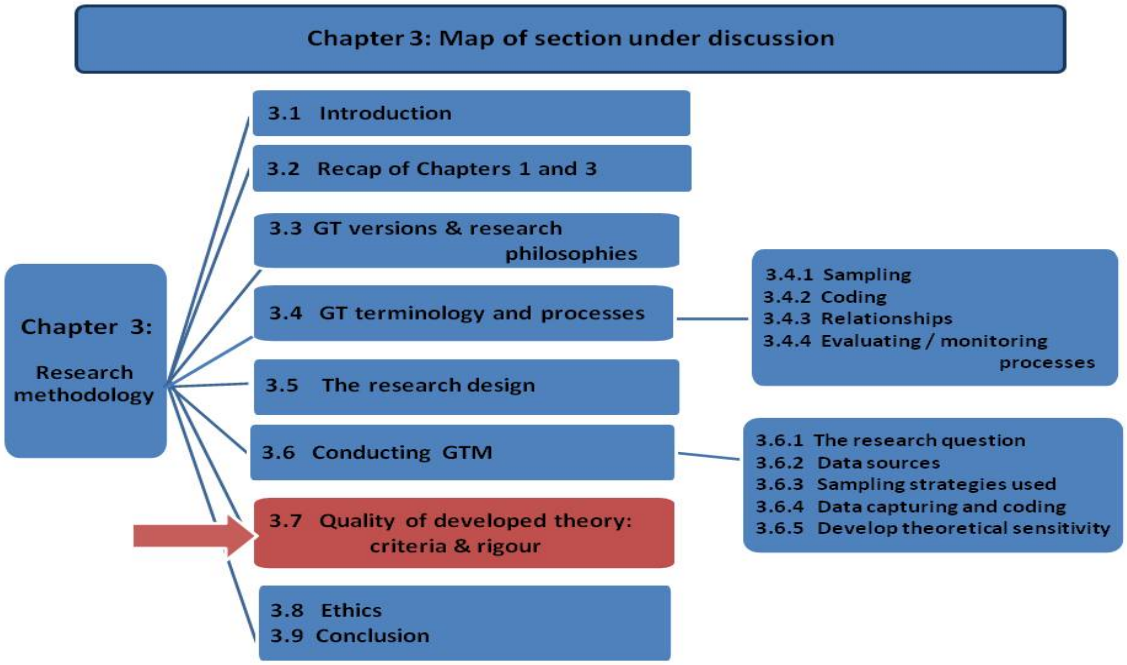
The theoretical framework that emerged enabled the researcher to model the dynamics of ROP. Figure 3.7 illustrates an initial attempt at modelling the dynamics of research output productivity. The modelling of the dynamics of ROP is discussed in Chapter 6.

Figure 3.7: A preliminary model of the dynamics of ROP



This section thus described the 'as-conducted' implementation strategy of this research and briefly touched on the theoretical components of ROP to introduce the execution cycles discussed in Chapter 4 to 6. The aspects of ethical research and the quality of developed theory were also considered in the planning stage and are discussed in the following two sections of this chapter.

3.7 Criteria for judging the quality of developed theory: rigour



When the quality of research and developed theory in GT studies are considered, two questions spring to mind, namely (i) how the quality of developed theory is evaluated and (ii) what measures should be taken to ensure quality research.

3.7.1 Quality criteria: how to evaluate the quality of developing theory

What does quality research imply in grounded theory application and developed theory? Quality terminology in the literature[58] refer to aspects of credibility, adequacy, rigour, trustworthiness, fit, trust in theory generated and related terminology (Cooney 2011: 17; Glaser 1998: 237; Corbin and Strauss 1990: 6; Wuest 2007: 263).Evaluation-criteria are advocated by leading grounded theorists, which include Wuest (2007: 264); Cooney (2011: 17-22); Corbin and Strauss (1990); Glaser (1978; 1992; 2010: 9); Hunter, Murphy, Grealish, Casey & Keady (2011: 9); Adolph et al (2011: 506-508); Graham & Thomas (2008: 120).

Adolph et al (2011:508) comments that the terminology GT researchers and developers use to describe quality-properties of developed theory – in other words, quality criteria – often differs. However Adolph et al (2011:508) comment that although these properties are often labelled differently, quality concerns focus on very similar issues. Examples of quality criteria as discussed in

[58] Mostly with reference to qualitative studies – this however does not exclude quantitative components – as indicated by Glaser (1967).

literature are listed to illustrate this point (and to assist in ensuring the quality of theory developed in this research):

Glaser (1998: 237); Glaser and Strauss (1967) and Van Niekerk and Roode (2009: 102)

These researchers evaluate the quality of developed theory against properties of fit, relevance, work or usability, and modifiability, where

- *Fit or validity,* questions whether the components of the theory (e.g. categories and relationships) are truly rooted in the data and whether developed theory fits the data. *Relevance* refers to whether the developed theory succeeds in integrating practical situations of the researched phenomenon and how plausible interest parties find the theory. This stands in contrast to theory-explanation that interest groups would find doubtful or irrelevant. The relevance concern is whether theory addresses the main concerns of the research. Relevance is closely related to usefulness:
- *Work or usefulness* evaluates whether developed theory 'works in practice' and whether developed theory can successfully be applied in the substantive area.
- *Modifiability l*eaves developed theory open to future modification should new (and contrasting) data become available (in future).

Charmaz (2012: 182-183)

Charmaz refers to the quality of developed theory in terms of credibility, originality, resonance and usefulness, and defines these properties as:

- *Credibility,* where credibility is concerned with the thoroughness of the research process to actually deliver the theory presented as developed theory. Thoroughness covers practical research aspects, e.g. the researcher's familiarity with his/her data; and proper research execution: sampling adequacy, effective constant comparisons, densification of categories, verified and justified relational links and sufficient evidence-cases.
- *Originality* refers to new and significant insight that challenges and enriches current knowledge.
- *Resonance* concerns the extent of the substantive covered, the generalisability of developed ideas; plausibility of theory to interest groups; and insights that the theory contributes to the research field.

Adolph et al (2011: 506-509)

Adolph et al evaluate the quality of developed theory in terms of trustworthiness and question developed theory's ability in this regard to answer to the following questions:

- Is the 'story' expressed in the developed theory a true explanation of the researched phenomenon and not a fabrication?
- Is the story (e.g. the developed theory) a good story (credible) that is interesting, adds to the body of knowledge in the research field and, if the knowledge is useful, can it be applied?

Lincoln and Guba (1985)

Lincoln and Guba define trustworthiness in terms of confirm-ability, dependability/audit-ability, credibility and transferability which are advocated by many grounded theorists, indicating that:

- Confirm-ability concerns how deduction and conclusions of the research were derived, with a focus more on input from research participants/subjects and conditions of the study and to a lesser extent on interpretation/ input of the researcher.
- Dependability/Audit-ability asks whether the developed theory will be consistent and stable (e.g. with respect to researchers and time). The property links to generalisability.
- Internal consistency (credibility). The internal consistency or credibility asks whether derived theory is consistent and credible to research participants and interest groups and readers, and whether theory explanation links the critical elements of the researched topic in context – this is also referred to as authenticity.
- Transferability. This property agrees with the concept of generalisability: can findings be transferred to other contexts and does developed theory constitute 'useful theory'?

The terminology listed in this section indicates that concern for the plausibility of theory explanation for researched phenomena; whether theory explanation is evidence-based in the data; whether theory can be adapted and generalised to accommodate more recent/future information; and whether developed theory has practical application-value are qualities researchers look for in developed theory. Adolph et al (2011:508) agree that different terminology labels eventually strive for similar quality theory results and that researchers should on a continual basis throughout research, ask how developing theory complies with these criteria.

3.7.2 Rigorous research: measures to ensure the quality of developed theory

How should GT research be executed to ensure that developed theory exhibits the qualities that researchers seek from their theoretical explanation of a researched phenomenon? Glaser (1998) answers this questions by stating that adherence to the systematic and logical analysis processes of GTM achieves rigour and represents rigorous research, e.g. theoretical sampling, coding that evolves from sampled data, constant comparison of open and substantive code, densification and saturation of categories, sufficient sampling, memoing, and sorting of memos are all processes that ensure a structure for theory development. Furthermore, according to Cooney (2011: 17-22) GT developers incorporate 'quality control' mechanisms (memoing, constant comparison, theoretical sampling and saturation) into their methodology to ensure the qualities of credibility, audit-ability and transferability in their end-product. This is confirmed by other researcher, for example, Glaser 1998: 19; Corbin and Strauss 1990: 17-20; Strauss and Corbin 1998, Charmaz 2012: 182-183. Correct application and trust in methodological processes will deliver rigorous research (Fendt & Sachs 2008: 436, 441) and quality in developed theory. In other words, rigour in research implementation goes hand-in-hand with the quality of the end product – process and product are inextricably linked (Cooney 2011: 18).

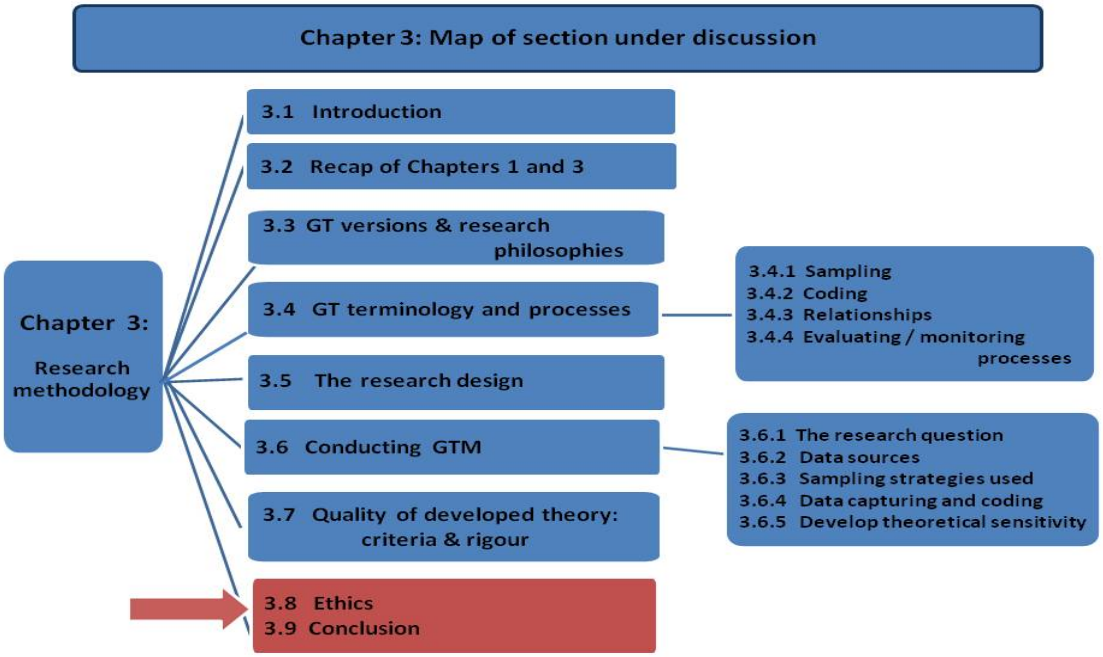
Cooney (2011) summarises the properties of quality criteria of credibility, audit-ability and fittingness and the 'how to' of rigorous research in tabular format. An adapted table is presented in Table 3.7 below.

Table 3.7 Desired qualities of developed theory and rigorous research practice

Quality criteria for developed theory, properties of these criteria and rigorous research (mechanisms) **(**Adapted from Cooney 2011: 20)		
Definitions of the tee quality criteria		
Credibility criteria - Evaluates how accurately theory describes a situation (Cooney 2011:10) - A vivid & faithful description of the phenomenon (Beck 1993)	**Audit-ability criteria** - A comprehensive record of methodological decisions and action taken (Guba & Lincoln 1989)	**Fittingness/ transferability criteria** - Findings that 'fit' non-research context - Findings viewed as useful & applicable (Sandelowski 1986)
Properties of the criteria		
1. A clear description of applied methodology. 2. Evidence that emerging codes were checked with participants. (Fendt & Sachs 2008: 436-441) 3. Evidence that participant suggested concepts were used to formulate new questions 4. Excerpts of data that substantiate findings/theory included in the write-up.	1. Description of researcher beliefs, values and assumptions is stated 2. The rationale for the research design is provided; as well as a description of research process, data collection & sampling 3. The analysis approach & theory-development process are explained.	1 The context of the study is clearly defined in terms of demographics, study characteristics, policy issues, etc. 2. How sampling proceeded is clearly stated. 3. A variety/ broad scope of responses that is true to everyday reality are included.
GT mechanisms that address credibility, audit-ability and fittingness criteria (Evidence of these mechanisms in the research process and write-up serves as evaluation baseline)		
- *Rigorous application of GT method* Concurrent data collection-analysis-comparison which is evidenced in changes to question formulation, categories, concepts, emerging theory based on new information and evidenced in event-excerpts of cross checking of concepts/ categories/ relationships	- *Meticulous memoing of the research process* This constitutes an audit trail that ensures audit-ability - *Researcher journaling* Statement of researcher's beliefs, values and bias (Corbin & Strauss 2008; Bowen 2005: 214) - *Reflexivity* (Hall & Callery (2001)	- *Contextual description* A description of environmental attributes, sample description, diversity of the sample, 'description of everyday reality of the substantive area' are included (Barker et al 2002).
Objectives of criteria towards rigour and quality		
An abstract *explanation* of a situation/ phenomenon – rather abstract explanation than descriptive (Cooney 2011: 19)	A precise description of *research processes* to the degree that others can repeat research if they so wish (Jenks 1995)	Contextual description to the degree that interested parties can *visualise the context from* which theory was developed (Chiovitti & Piran 2003)

The deduction is made that these criteria offer a practical way of monitoring and evaluating rigour and quality of research. Throughout research execution and write-up of this study the researcher strove to compare developing theory to these guiding principles of rigour and quality. The remark by Cooney (2011:22) that quality of grounded theory is eventually measured as developed theory that makes sense, provides an understandable explanation of a phenomenon, and 'speaks for itself' is very applicable.

3.8 Ethics



"Research [very often] involves collecting data from people, about people" (Creswell 2009: 87). Sensitivity and respect for people, their human rights and dignity are therefore critical elements of research integrity and the quality of research. This is the essence of ethical conduct. Ethical issues concern all phases of the research process and should, to ensure quality research, be anticipated and provided for when planning research, prior to research commencement. Ethical issues do not solely concern the *data collection, interpretation* and *write-up* phases of research, but also guard sensitivity during research *topic- and research question formulation*. The issues that need consideration in this study and measures taken to ensure ethical conduct (Creswell 2009: 87-93) are commented on below.

3.8.1 Ethics and topic and research question formulation

When selecting a research topic it is ethical to choose a topic and substantive research area that will benefit society in general, the research participants and not only the researcher. Research questions should likewise ask questions of the substantive field that will contribute to the improved circumstances of the community researched and not serve solely as a comfortable research area for the researcher. Creswell (2009) argues for sensitivity (in topic- and research question formulation) towards sensitive issues and groups. Research should uplift and not negate or show disregard for particular individuals or groups.

The topic of this ROP research concerns the phenomenon of *the dynamics of the publication of research findings within an academic environment*. Some of the available data sources of this research consist of response data of academic researchers, managers, editors and statisticians. These individuals constitute the research participants of the study. Within their working environment the participants are regarded as contributors to the advancement of national education and development in South Africa and therefore do not fall in a category of marginalised

populations or groups. Furthermore, the topic is equally relevant to academic researcher, role players and management, although for different reasons. ROP issues are of concern to the broader community of South Africa and do not represent a research area that will solely benefit the researcher of this study. In this sense the research topic and research questions were selected for the interest of the broader community.

3.8.2 Ethics, human rights and ethical clearance

Specific aspects of ethical research were also considered in the planning this study. These included the aspects of human rights protection, ethical clearance of questionnaires to be administered to UNISA staff and ethical conduct when questionnaires are administered.

Formal ethical clearance of proposed research

The Constitution of South Africa[59] protects its citizens from human rights violations: these rights also apply to research participants to ensure fair treatment in research situations. In agreement with the Constitution, research at HEIs is underwritten by institutional Ethics Research Policies and Ethics Review Committees. The Ethics Committee of the College of Education of UNISA is an example of such a committee appointed in accordance with the Ethics Research Policy of UNISA (UNISA 2012; 2007)[60]. These committees are tasked to evaluate the ethical aspects of proposed research. The reviews ensure that proposed research does not pose a risk/harm to research participants in any way. An ethical clearance application was presented to the Ethical Committee of the College of Education of UNISA and ethical clearance for this research was granted. This certificate was handed in when the thesis was submitted for examination.

Informed consent

Ethical conduct furthermore requires that research participants in a study indicate their willingness to participate in research through informed consent. This research anticipated using questionnaires and informed consent was incorporated in the cover letter of these questionnaires. (As briefly indicated in Sections 3.6.4 and 3.6.6 in actual analysis cycles of this research interim results indicated the need for information from academic researchers and other role players which was collected via questionnaires). Prototypes of cover letters that provide for informed consent were submitted to the afore-named College of Education Ethics Committee and clearance was received).

Ethical aspects addressed in questionnaire cover letters

To ensure that a research participant is sufficiently informed about particular aspects such as his/her human rights; the purpose of the research; and eventual use and application of research findings these aspects were also commented on in the cover letter of the questionnaire eventually used in this research. Information on the following were provided: the researcher of the project; purpose of the research; guarantee of confidentiality; the participant's right to withdraw from the study at any time; and contact information should the participant require additional information and feedback on the study. These aspects were addressed in the prototype questionnaires submitted to the Research

[59] Act 108 of 1996, http://www.gov.za/documents/constitution/1996 /a108-96.pdf

[60] http://www.UNISA.ac.za/contents/colleges/col_grad_studies/docs/Policy_research_ethics_21September2007.pdf

Ethics Committee of the College of Education (please refer to the cover letters of the open and closed-ended questionnaires that were used in this study and that appear in the appendices of Chapter 4 and 5).

Ethics that concerns data analysis, interpretation, research reporting and dissemination of findings

Research integrity remains a critical element of research throughout research: how collected data will be stored and if/when/and how data should eventually be deleted/ destroyed; how continued participant confidentiality should be ensured when dealing with captured participant responses; and how data-ownership should be managed. In the study under discussion questionnaire-response data will be recorded by randomly assigning a record number to each participant (participants will complete questionnaires anonymously). Questionnaire responses will be captured electronically by the researcher in person to further safeguard anonymity. Backups will be kept, updated and secured (data is stored in password protected directories). It is envisioned that data will be preserved for a period of three years and then removed from the system. This was indicated in the ethical clearance application.

Research integrity also extends to the way research findings are reported and disseminated: results should be reported in unbiased language that does not mislead and which interprets findings accurately. Ethical behaviour promotes the dissemination of quality research findings. The researcher will strive to adhere to these principles and will refer back to ethical standards and quality criteria as research implementation progresses[61].

3.9 Conclusion

The introduction to this chapter explained the different schools of thought that underlie grounded theory methodology indicating that different approaches to GT had developed (versions) and that these schools of thought have an impact on how GT method is implemented and results are interpreted. The chapter indicated that the mentioned schools of thought not only differ with respect to how GT is conducted but also with respect to research philosophy. To enable this research to practically apply the method of GT a decision had to be taken on which version of GT would be most appropriate for the context of this study; whether specific versions of GT were exclusively linked to particular research philosophies; which research philosophy this researcher felt comfortable in supporting; and, whether the research philosophy this researcher supports fits in with GT version and research philosophy combinations. An investigation into this matter indicated that the various GT versions can accommodate a range of philosophical underpinnings. The discussion of this section of Chapter 3 concluded by indicating that this study intends implementing classic GT and that a pragmatic research philosophy (theoretical framework) would underpin the research.

The discussion in this chapter then moved on to a general description of the principles that underlie classic grounded theory methodology; definitions; and an explanation of classic GT terminology. The discussion covered the cyclical method of data collection, analysis (coding) and comparison and commented on the implication of this technique for reporting on the planning, execution and

[61] For example, Creswell (2009:92) regards it as unethical to use contributions of colleagues in research publications and not acknowledged such contributions by means of co-authorship.

findings of research because of the cyclical nature of the method as compared to the linear planning, execution and results-discussions of more conventional research approaches..

To accommodate the effect of the cyclical nature of the GT method in the discussion of research planning, Section 3.6 presented an envisioned research implementation discussion with an 'as-conducted' discussion section – the latter component incorporated once actual research had progressed to an advanced stage. The incorporation of the 'as-conducted' component to the planning discussion is attributed to the fact that GT cycles of data collection, analysis and comparison dictate which data (and information) will be required in subsequent analysis cycles (Chapters 4 and 5) to inform previously developed theory. Therefore data sources, data collection method and sample size only become known during research implementation as analysis cycles progress and actual, relevant, data sources are identified and used. The 'as-conducted' component could only be added to the planning discussion of this Chapter 3 once analysis had progressed substantially (This is explained in detail in Chapter 4 and 5). The section on research planning also includes a brief visual summary of theory development which explains the choice/s of data sources and data collection instruments used to inform and advance developing theory.

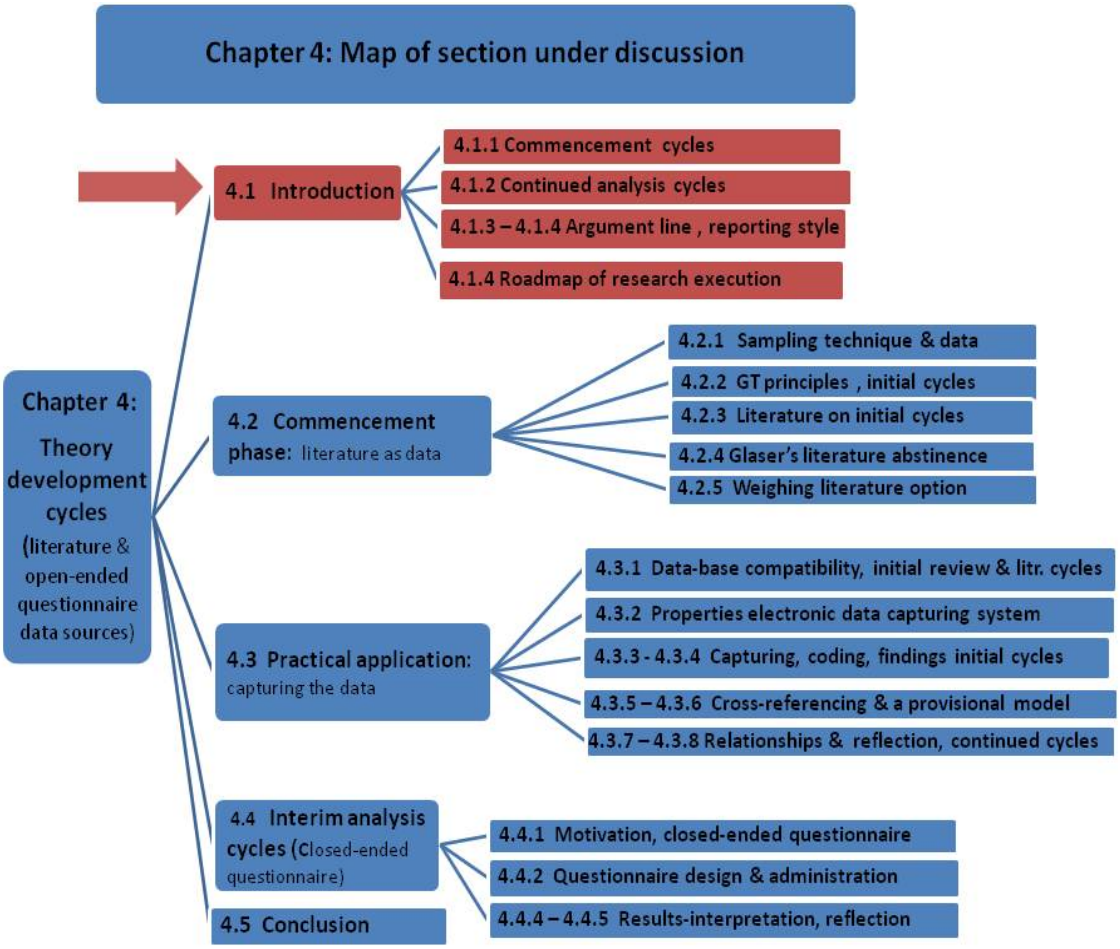
This chapter concludes by addressing the issues of research quality, integrity and ethical conduct. The chapter thus sets the stage for the practical implementation of research that is discussed in Chapters 4 and 5. The report on research findings is spread over two chapters, because research findings and progression naturally fell into two parts: initially a broad investigation and development of conceptualisations that crystallised into tentative ROP categories (Chapter 4) which than gradually moved over to the emergence of a theoretical structure and framework for ROP. The latter was investigated in the delimited substantive area of the researcher environment (Chapter 5).

(The appendices to Chapter 3 are included in the General Appendix at the end of the thesis)

CHAPTER 4

Cycles of theory development: sourcing the literature and an open-ended questionnaire

4.1 Introduction: An overview of the discourse and a framework for Chapter 4



The current chapter, Chapter 4, reports on the initial and interim results of GT analysis on research output productivity (ROP). The results were derived from cycles of data collection-analysis-comparison conducted on two data sources of relevance, namely, literature from the introductory literature review of this study and participant responses to an open-ended questionnaire (which was designed to source information on specific aspects of the developing theory). In addition, information was also, on occasion, sourced from field notes, informal communications, memos, additional literature and a collection of co-authored articles when theory development so indicated.

The discussion of the results builds on the groundwork prepared in the previous three chapters, namely the motivation for the selection of *article productivity* as research topic (Chapter 1); a rationale for grounded theory method (GTM) as an appropriate means of investigating the dynamics

of *article productivity* (Chapter 2); a rationale for the stance of this study on the timing of reviewed literature (Chapter 2); the subsequent introductory literature review – adhering to the open-minded approach of GT and at the same time complying with basic thesis structure requirements (e.g. identifying a little researched field and a knowledge gap in existing knowledge; Chapter 2); and a description of the various GTM methodology-versions currently used in research (Chapter 2). The last mentioned issue was investigated to motivate the choice of classic grounded theory methodology as appropriate for this study (Chapter 3). Classic GT method was subsequently detailed in Chapter 3. The results reported in this chapter (Chapter 4), therefore, describe the findings and theory development of the commencement and interim execution cycles.

4.1.1 The commencement cycles

The discussion of results in Chapter 4 will initially focus on motivating the use of literature from the introductory review (Chapter 2) as commencement data source; and also report on initial analyses and results derived in this cycle. The discussion will also intermittently consider whether analysis findings up to a certain point succeed in identifying concepts, abstractions and relationships that elevate the level of theory development on ROP. The questions will be evaluated because theory development is the ultimate objective of the study. The discussion will indicate that findings in the commencement cycle/s mainly consist of an array of events that directly or indirectly link to ROP. As analysis cycles[62] continue, discussion will indicate how the mentioned array of events – that initially seem to describe isolated events - evolve and suggest emerging conceptualisations that directly or indirectly link to the research process and ROP. The summative deduction section speculates that these conceptualisations are forerunners of ROP categories and the first indication of theory emergence: for example, data events seem to suggest an environment concept. This is taken as a forerunner of an environment category with dimensions of a broader government milieu, as well as institutional-, departmental-, researcher-, editorial sub-environments. The summary discussion of the commencement cycle/s will furthermore indicate that several issues related to emerging concepts have to be investigated in more detail to advance ROP theory development. This signifies the need to theoretically sample an additional data source to inform these issues.

4.1.2 Continuing analysis cycles

In the second section of analysis reporting in this chapter, verification of a specific ROP category, namely the environmental category, receives special attention. The reason for this is that research development pointed to a specific need: the volume of data events (and suggested concepts) collected and coded in the commencement cycles were developing into a voluminous and overwhelming data-set. This brought the realisation that the research could move in the direction of broad description without sufficient depth to develop a theoretical model on ROP. The need became obvious for a type of delimiter of the substantive field to keep the study focused on events that pertain to ROP via the research process and via the researcher and statistical support services. These aspects represent the vantage point of this research. The argument for a delimiter of the substantive research field was therefore elaborated and the environment category proposed as a delimiter.

[62] 'Analysis cycles' refers to data collection, coding/ or analysis and comparison of collected open or conceptual code to previously coded code – which could represent open-, conceptual-, or theoretical code and relationships. 'Analysis cycles' are used as an acronym to prevent a lengthy description each time reference is made to this mentioned procedure.

This second section of analysis reporting did not focus solely on verification of the emerging environment category. Discussion will indicate that other conceptualisations were also investigated with the aim of verification and densification: these concepts include suggestions of a research process, research practice and role players in a researcher environment. The discussion will indicate that to inform the mentioned issues the need for an alternative data source grew. A data source was required that could be sampled theoretically on specific issues. This resulted in the identification of a to-be-designed open-ended questionnaire that would sample required information from role players in research. Prior to the presentation of results, this section therefore firstly motivates the choice of an open-ended questionnaire as appropriate data source in this stage of the investigation; argues the pros and cons of interviews to an open-ended questionnaire option; discusses the need for research role players' input; describes the design and reasoning behind question formulation; and, lastly, reports on the findings of the analysis of participant responses. This section also intermittently points out how other data sources verify and enrich the emerging theory. This section concludes by evaluating progress in theory development and considers which new, additional data sources should be used next to further emerging theory.

4.1.3 The continued argument line of theory development in Chapter 5

The discussion of research implementation and theory development is spread over two chapters, Chapters 4 and 5. This was done to avoid the discussion of results in Chapter 4 from becoming too lengthy and because analysis cycles fell broadly into three stages, namely, a commencement or literature cycle; an intermediate or open-ended questionnaire cycle (both covered in this chapter, Chapter 4) and an advanced or closed-ended questionnaire cycle (Chapter 5). To complete the discussion framework of the previous section (the current Chapter 4), the discussion in Chapter 5 will indicate that another data source, namely participant responses to a still-to-be-designed closed-ended questionnaire (in conjunction with other data sources) was regarded as an appropriate data source and theoretically sampled to verify, refine and support theoretical coding and formulation of a theoretical model for research output delivery. Motivation for the theoretical sampling of this source and the presentation of analyses and theory refinement will constitute Chapter 5. This brief description on research implementation serves to outline the framework of discussions of research findings and theory development which was (except for the commencement cycles) guided by theoretical sampling.

4.1.4 Convention for reporting research results of a cyclic, non-linear execution process

It was emphasised in Chapter 3 that the research actions of data collection, analysis and constant comparison happen concurrently and overlap during research implementation (Kan and Parry 2004: 467, 470). These cycles are recurring (Eaves 2001:657): for example, while data is sourced from one (or more) source/s at any given time, data that has already been collected can, concurrently with other actions, be analysed and compared against coded information collected and processed somewhat earlier. Process overlap occurs because data is analysed/ coded as soon as it becomes available. In Chapter 4, the analyses of literature from the introductory review and the collection and analyses of the open-ended questionnaire responses overlap to some extent: active sampling from the literature gradually came to a halt while theoretical sampling of the open-ended questionnaire

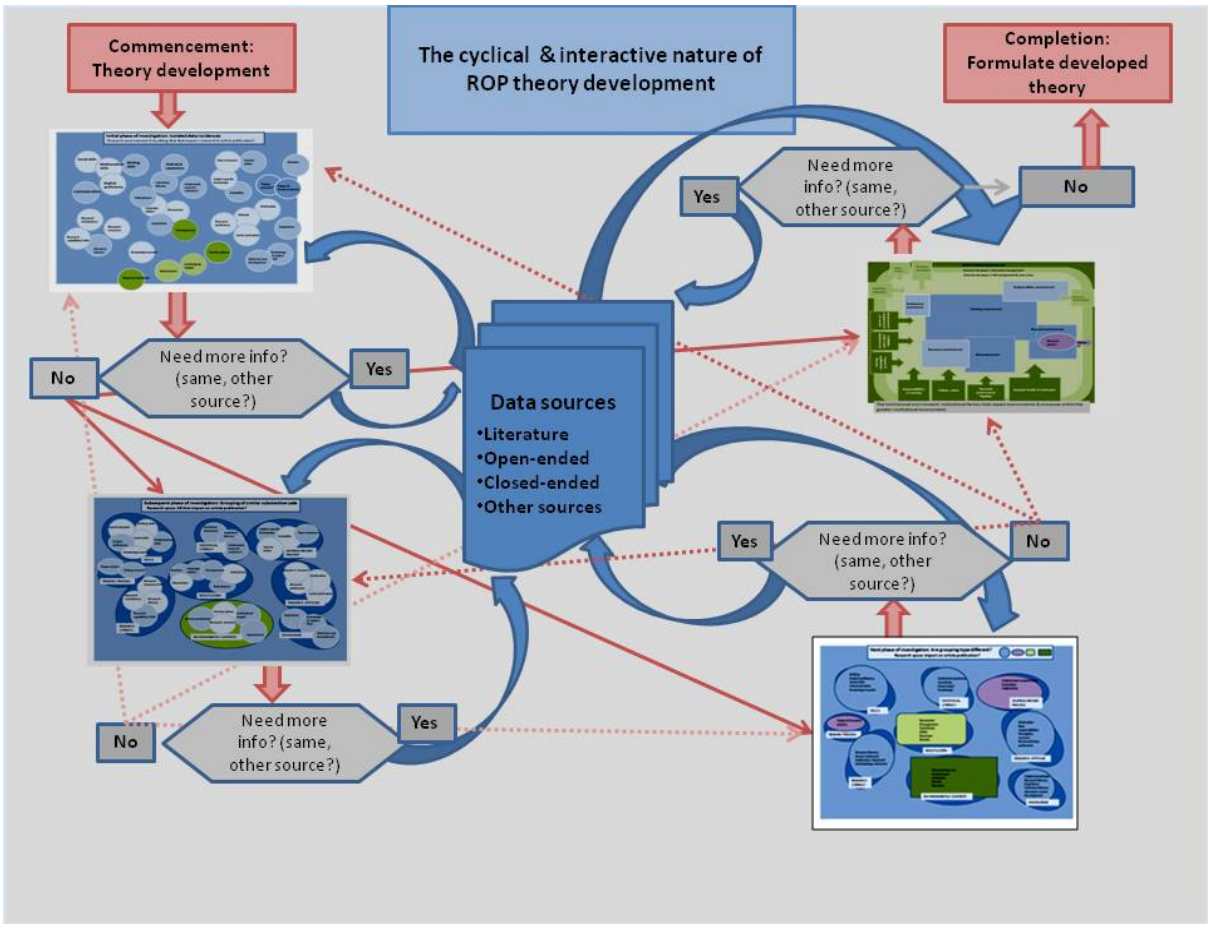
responses gradually increased (responses from questionnaires were analysed as each questionnaire was returned). This cyclic process impacts on the way results are reported in Chapter 4 as well as Chapter 5 (Kennedy and Lingard 2006; Goulding 2004:296; Storberg-Walker 2007). How should the findings of a non-linear process be reported in a linear fashion?

One option for a reporting-style option would be to alternate results reporting between different data sources as these sources are sampled and analysed. This will accommodate the flow of actual research execution. On the other hand, this reporting style could become confusing and very lengthy (Dunne 2011:120). For this reason, Chapters 4 and 5 follow a report-style that presents results in a more chronological order per data source that served as primary source at any given stage in research execution. At times, intermittent reference will be made to those data sources that were additionally sampled to further inform specific theory development aspects. Thus, although GT methodology follows a non-linear execution procedure, analysis reporting will keep to a more linear, data source-sequence report style to ensure a logical thought- and theory development discussion.

4.1.5 A *research execution roadmap* of Chapter 4 and 5 to explain the discussion framework

By incorporating the visual elements of theory progression (the square diagrams) from Chapter 3 into Figure 4.1, the figure illustrates the concurrent and cyclical nature of theory development. For example, in the interim cycles of analysis, theory may be sampled from the literature to provide open code to broadly inform an emerging conceptualisation. At the same time, information may be sourced from response data to a closed-ended questionnaire and other data sources on a very specific aspect of a category or relationships, informing theoretical code or category densification to advance the final theoretical model of ROP. This then serves to complement the decision for the linear per-data source discussion framework for results presentation outlined in the previous sections.

Figure 4.1: The cyclical and interactive nature (curved and straight arrows**) of ROP research execution and theory development (**square diagrams**)**

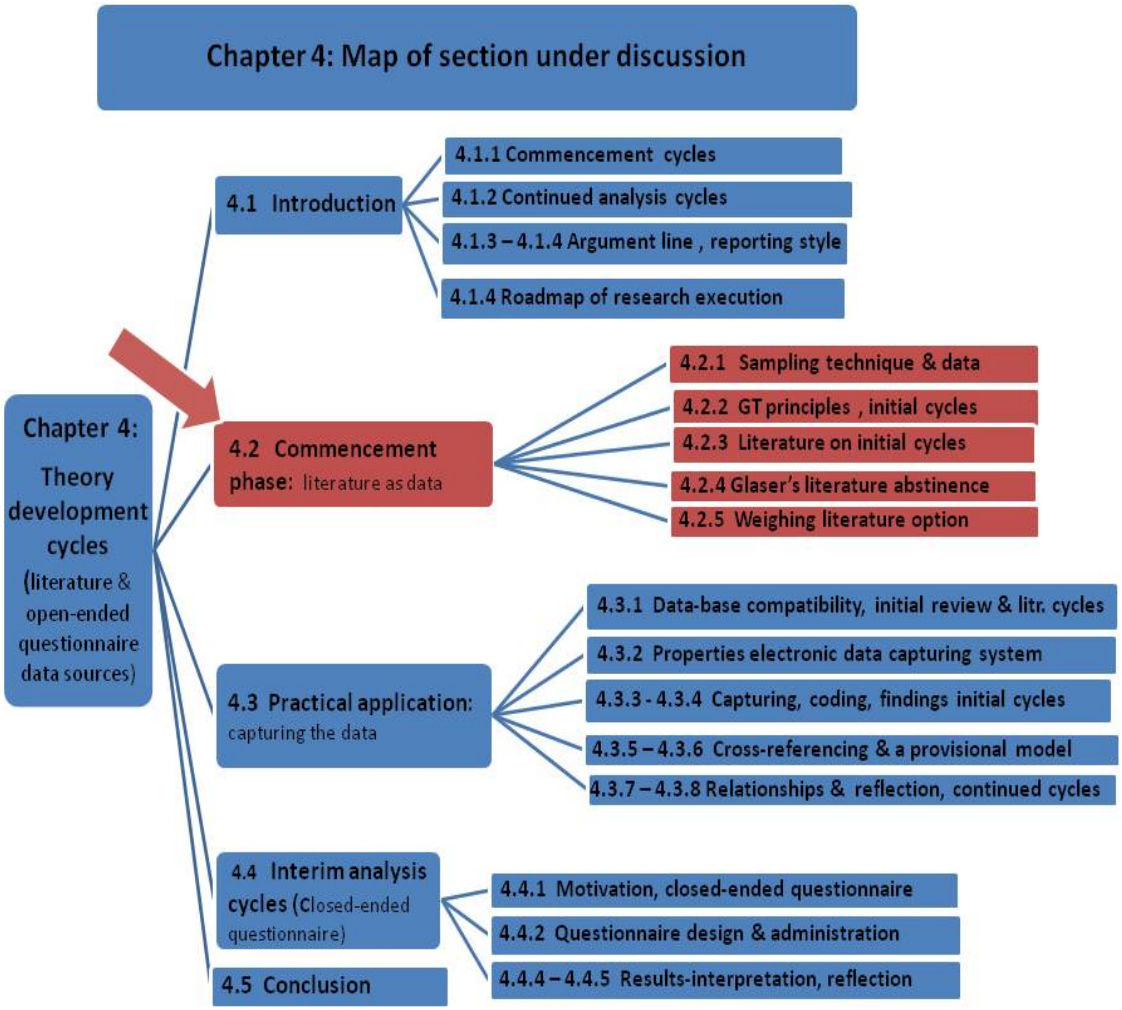


Comment

Chapter 3 (Section 3.4) motivated classic GT method as the version of GT implemented in this research. For the sake of clarity it is reiterated that that GTM will be used throughout this thesis to refer to GT methodology that supports the principles of classic GT methodology. When specific reference to one of the other versions is made, it will be indicated as such (e.g. Straussian GTM).

Section 4.2 to follow now motivates the use of the literature from the introductory review as commencement data source for this research. This section will also describe how data from the commencement source was captured (Section 4.2.2); how the data was analysed (Sections 4.2.3 – 4.2.5) and how initial theory emerged in the collection-analysis-comparison cycles (Sections 4.2.6 – 4.2.7).

4.2 The research commencement phase: literature as data source



4.2.1 Commencement cycle research execution: sampling technique and data

> "Initial sampling in grounded theory is where you start, whereas theoretical sampling directs you where you go" (Charmaz 2012:100)

GT research requires data (Morse 2007: 229; Sbaraini, Carter, Evans, and Blinkhorn 2011) to start the cyclical process of analysis, coding, comparison and theory emergence and development (Breckenridge and Jones 2009). This statement seems self-evident, but in GT execution the starting point for data collection requires careful consideration because of the pre-requisite that theory and categories have to start emerging before theoretical sampling can commence. This pre-condition makes theoretical sampling an unsuitable initial sampling method. Theoretical sampling is based on the principle that emerging theory (category emergence) dictates what data (and source) should be sampled to advance, inform and densify emerging theory. In these situations additional data can effectively be collected by theoretically sampling specific areas to inform specific concepts, or categories, or relationships (Munhall 2007:248; Charmaz 2012:102). This implies that theoretical sampling only comes into effect once analysis of 'some initial data' has progressed to the point where categories and theory begin to form. This implies that data have to be acquired by some means at the onset of research up to the point where theory start to emerge and can dictate

theoretical sampling. An alternative sampling technique is therefore required for the commencement analysis cycle (Holton 2007: 278; Breckenridge and Jones 2009).

The literature indicates that, contrary to the theoretical sampling of data sources in the interim cycle GT execution, initial sampling of a data source should proceed purposively. Since no theory has been developed at the onset of research and no theory is available to direct the sampling, initial sampling should be based on researcher discretion (Gerrish and Lacey 2006:196; Munhall 2007:248; Sbaraini, Carter, Evans, and Blinkhorn 2011). Sbaraini et al (2011), for example, use interview responses (purposively sampled) of participants of a previous study (2008) on the MDPP program (Monitor Dental Practice Program) in New South Wales to serve as a commencement data source in a similar study in 2010-2011. The reason offered was researcher conviction (purposeful sampling) that views expressed by the previous participants were relevant and informative for the subsequent research study.

For the present study the options of commencement data sources also had to be considered. To this end the underlying principles of GT regarding commencement phase data sources, and commencement data sources found appropriate by independent GT researchers, were reviewed. This commencement data source investigation strengthened the researcher of this study's conviction that literature from the introductory review would be appropriate to commence GT analysis. The subsection that follows elaborates on this investigation.

4.2.2 GT principles on research commencement and initial data sources

Principles on suitable data sources for GT analysis include, for example, the following:

- *The GT principle of what constitutes data: "all is data"*

Grounded theorists regard all information of relevance to a specific study as data (e.g. Glaser 1998:8; 2001:145). In this regard Garrish and Lacey (2006: 203) quote Glaser and state:

> "Exactly what is going on in the research scene is data, whatever the source".

Examples of data sources mentioned in GT literature include interview responses; survey responses; notes on informal communications; memos; field notes; documents and textual data (which is further defined as inclusive of reports; annual reports; policy documents; and even time sheets). In this regard James and Alony (2011:103) specifically include data sources from the literature (such as literature reviews) as data and then more specifically classify literature under "textual documents". In this regard James and Alony (2011) also refer to Glaser's definition of data:

> .. whatever the source, whether interviews, observation, documents. It is not just what is being, how it is being, and the conditions of it being told, but all the data surrounding what is being told.

The choice of the commencement phase data source is therefore subject to the same principles of acceptable GT norms for data sources than data sourced during the interim and more advanced cycles of GT research: if literature from a literature review is an acceptable data source in the intermediate analysis cycles, reviewed literature is an appropriate data source in initial sampling. Suitability, however, has to consider whether the 'acceptable data' will promote and enrich theory development (Stern 2007:117 in Bryant and Charmaz 2007). This speaks to another commencement-source guideline.

- *The principle of rich, relevant and informative data that is accessible and promising*

The literature furthermore indicates that data – be it in the initial or advanced stages of sampling – should be sampled based on relevance, richness-value and potential to inform. This principle also applies to commencement data sources (Holloway and Todres 20006: 195: in Gerrish and Lacey 2006). Munhall (2007:248) adds that accessibility of data is another criterion for data source selection. In GTM, data is sampled to promote or initiate theory development: the ultimate objective of GT research (Stern 2007: 116; Charmaz 2012:14). Charmaz (2012:100) argues that choice of the commencement data source holds an element of risk because, contrary to the intermediate analysis cycle, a researcher cannot, in the commencement phase of data collection and analysis, guarantee that a data source *will* promote theory development. The possibility is ever present that the source initially selected does not promote development and that in the long run another data source may prove to be a more appropriate data source – a gamble researchers have to take (after careful consideration of options). However, a researcher has discretion, initially, on which most promising lead should be selected: sampling should start with the data source the researcher sees as most promising. These aspects of relevance, accessibility, richness, informative-value and theory-generating potential should guide the selection of commencement phase data sources.

4.2.3 Guidelines provided by the literature on commencement data sources

In addition to the mentioned guidelines for acceptable data sources in general, the literature was consulted on commencement data sources in independent research. Practical guidelines were traced in the literature and reported below.

GT research mentions in this regard that literature reviews form an integral part in any doctoral research endeavour (in this context, referring to all research design types) and that inclusion of a literature review is standard research practice (Morse 2007: 235) for several reasons. These reasons include, inter alia, compliance with research and ethical clearance requirements of institutional regulations, and, importantly, to orientate the research (Cutcliffe 2001:1480; Holton 2007:278) and identify knowledge gaps (Marland 2003; Holton 2007:278). As discussed in Chapter 2, the timing of the literature review can be problematic in GT research when institutional research requirements have to be adhered to. The stance of this study on an introductory literature review was clarified and a review presented in Chapter 2.

The wealth of information contained in the introductory review of this research triggered the idea that literature could serve as commencement data source for this research. Would such a step be justifiable?

The acceptability of using literature from a broad review as a commencement data source can be argued as follows: apart from serving the intended purpose of orientating research and identifying a knowledge gap to motivate research (McGee 2005:116; Hallberg 2010:2; Chen and Boore 2009:2251-2270; Morse 2007: 235-236); and demarcating the research field (Morse 2007: 235-236); a considerable volume of additional, rich information may lie dormant in the literature covered. Such data almost unintentionally becomes available as 'by-product' or bonus to the initial intent of the literature review. This dormant, readily available knowledge often suggests initial and tentative

concepts, categories, relationships and abstractions to explore further. In this way a general introductory literature review offers a relevant, rich and accessible initial data source.

Examples in the literature of studies that followed this approach include:

- *The development of a theoretical model on corporate turnaround:* Pandit (1996) indicates how literature from a literature review on corporate turnaround served as a commencement data source in a GT study to develop a theoretical model of the named topic. (In more advanced analysis cycles, Pandit sourced data from a series of on-line computerised databases which became his primary data source in intermediate and final cycles of research). Pandit (1996) quotes Strauss and Corbin (1990:52) to support his decision in this regard:

  > The literature can be used as secondary sources of data. … These publications may also include descriptive materials concerning events, actions, settings, and, actors' perspectives that can be used as data - using the methods described.

- *A GT study on e-Reverse Auctioning:* Losch (2006:133) in turn reports on a GT study on E-Reverse Auctions in the United Kingdom in which a literature review on E-Reserve auctioning served as a commencement data source (in conjunction with a previous exploratory study on e-reverse auctions). The literature review was used to tentatively identify constructs (categories) of the envisioned theoretical model. These construct-suggestions were then integrated into the design of a questionnaire. Participant responses to the designed questionnaire thereafter served as primary data source in continued research.
- *The development of a GT Literature Review Model (GTLRM):* Wolfswinkel, Furtmueller and Wilderom (2011:1-11) report on a study in the Netherlands on the development of a GT Literature Review Model (GTLRM) to guide author-researchers who write review papers and need to review literature effectively to capture and report on the most recent and relevant research findings. As an initial data source research started off with a purposively selected broad overview of the literature and thereafter theoretically sampled the literature (according to set guidelines) to eventually terminate sampling (and analysis cycles) with a subset of excellent references.
- *A theoretical model to develop first-time fathers' paternal competencies:* Andrews, Higgens, Andrews and Lalor (2012) in turn, describe how a literature review was used as an initial data source in a GT study of first-time parents' postnatal educational needs: a theoretical model of the educational needs of these fathers was developed. The initial literature review served to inform the development of a semi-structured interview schedule. The interview was administered to theoretically sampled participants and interview responses subsequently became the primary data source of the study. This study illustrates how literature from a broad literature review was used as a commencement data source to design a measuring instrument (interview schedule or questionnaire) for subsequent theory development.
- *Conceptual development in applied theory building research:* Storberg-Walker (2007:63, 69) describes an interesting study on the process of 'conceptual development' in applied theory building research. In this study literature on theory building served as primary data source throughout the study with the focus of the research progressing from the general to the specific: initially research focused on literature that covered studies of major (overall) theory building approaches and progressed to the theoretical sampling of literature on specific issues on the dimensions of theory building, such as the specific phases of theory building processes (2007:75).
- *A theoretical model on the management and utilisation of the ICT industry:* Fernandez, Martin, Gregor, Stern, Vitale (2007:231-246) discuss how literature served as departure point to structure

a preliminary survey instrument used to theorise the use and management of ICT (information and communication technology) in industry in Australia.

- *The modelling of Agile teams in Software Engineering:* Hoda (2011) describes a study on Agile teams in Software Engineering that used the literature (a review of the literature) to identify constructs (theoretical concepts/categories) that assisted the formulation of interview schedules as measuring instrument. The subsequent data-base of interview responses then supported the development of a theoretical model on self-organising Agile teams in Software Engineering. (Agile development is a specific approach to managing IT development teams).

These examples of grounded theory studies that used reviewed literature as a commencement phase data source, in conjunction with the GT guidelines of acceptable data sources, strengthened the conviction of this researcher that the literature initially reviewed in this study could serve as a commencement phase data source. As a final step in the investigation on the feasibility of reviewed literature as an initial data source, Glaser's (1998:67-68) dictum of literature abstinence is considered in the next subsection.

4.2.4 Glaser's literature abstinence dictum against literature as data

Set against the backdrop of the above discussion a final consideration for the suitability of literature from the initial review as a commencement data source is obtained by weighing such a source against Glaser's early dictum (Glaser 1998:67-68) that researchers should not be influenced by existing theory from the literature during the early stages of research. Argumentation in this regard reasons that:

- *A more relaxed approach towards the literature has been assumed in recent years:*

It was indicated in Chapter 2 that theoretical preconception was made a contentious issue in the early years of GT inception (e.g. Glaser 1998:67-68). However research practice and insight have shifted dramatically over the years and a more relaxed attitude regarding the timing, format, placement and purpose of literature reviews is advocated (please refer to Chapter 2, Section 2.3.1.3). Recent GT literature emphasises that researchers declare their previous experience and theoretical knowledge in a substantive area and advocates awareness that prior (theoretical) knowledge has the potential to influence new theory development – in other words creating awareness of the potential impact of prior knowledge (that cannot be denied) rather than ignore such knowledge (Urquhart 2007:351, in Bryant and Charmaz 2007). Charmaz (2009: 469,471) in Alasuutari, Brickman and Brannen (2009) for example comments on research-flexibility by indicating that a "procedural approach" and "a preconceived form for the method" of GT (also with respect to the literature) without attention to context and the purpose of the specific research action (e.g. review of the literature) restricted research practice in the past and still has the potential to do so. GT method should be flexible to research context, purpose and content. This includes the timing and use of literature in GT research as well.

- *In substantive areas where limited research has been undertaken the risk of introducing bias by reviewing literature early in the study is minimal:*

Initially the possibility of theoretical bias motivated Glaser's dictum for no literature in the early stages of research. Glaser's dictum applied to an early orientational review of the literature as well as the use of literature as data source in the early stage of research (Glaser and Strauss 1967). With the recent more flexible approach towards literature it can currently be argued that in substantive areas where little research has been undertaken (as is the case with the study under discussion), and

where the aim of the initial review is to orientate and identify boundaries and knowledge gaps, the impact of existing theory from the literature is minimal: little is known and limited theory exists that can introduce bias. Add to this the fact that the literature has to be consulted for other reasons as well: for example, compliance with research requirement where a research project is motivated against an identified knowledge gap; where a review of literature is required when applying for research and ethical clearance; and where a literature review is required to apply for funding to prove that research substantiated.

- *The risk of bias should be weighed against the purpose, format and extent of a literature review*

The issue of whether theoretical-bias is introduced into studies when information contained in reviewed literature is used as a commencement data source should also be weighed against the purpose of the review (to demarcate, orientate, identify knowledge gaps, etc); the extent of the review; and the format of such reviews. For example, the format and extent of an initial orientational review will be broad and somewhat superficial in an attempt to scope the entire research field. Specific in-depth focus on detailed theory of independent research (that could influence new theory development) is not the focus of an initial literature review. Its purpose is, rather, orientation in the substantive field. (If theoretical models are reported in initial review, it is likely that interest will focus on whether such theoretical models exist - to determine the status of theory development in the field - rather than an in-depth theory-detail investigation). Therefore the possibility of introducing theoretical bias in a study by using literature-information of an initial broad-scope review as a commencement data source appears limited, especially if a researcher is sensitised to the possibility of such bias.

- *The substantive research area of the study*

A feature of GTM is that it is an appropriate research method in areas where limited or no theory development has occurred. This fact implies that literature on theory in such research fields will be limited or non-existent, therefore greatly reducing the opportunity of 'theoretical contamination' which Glaser originally warned against.

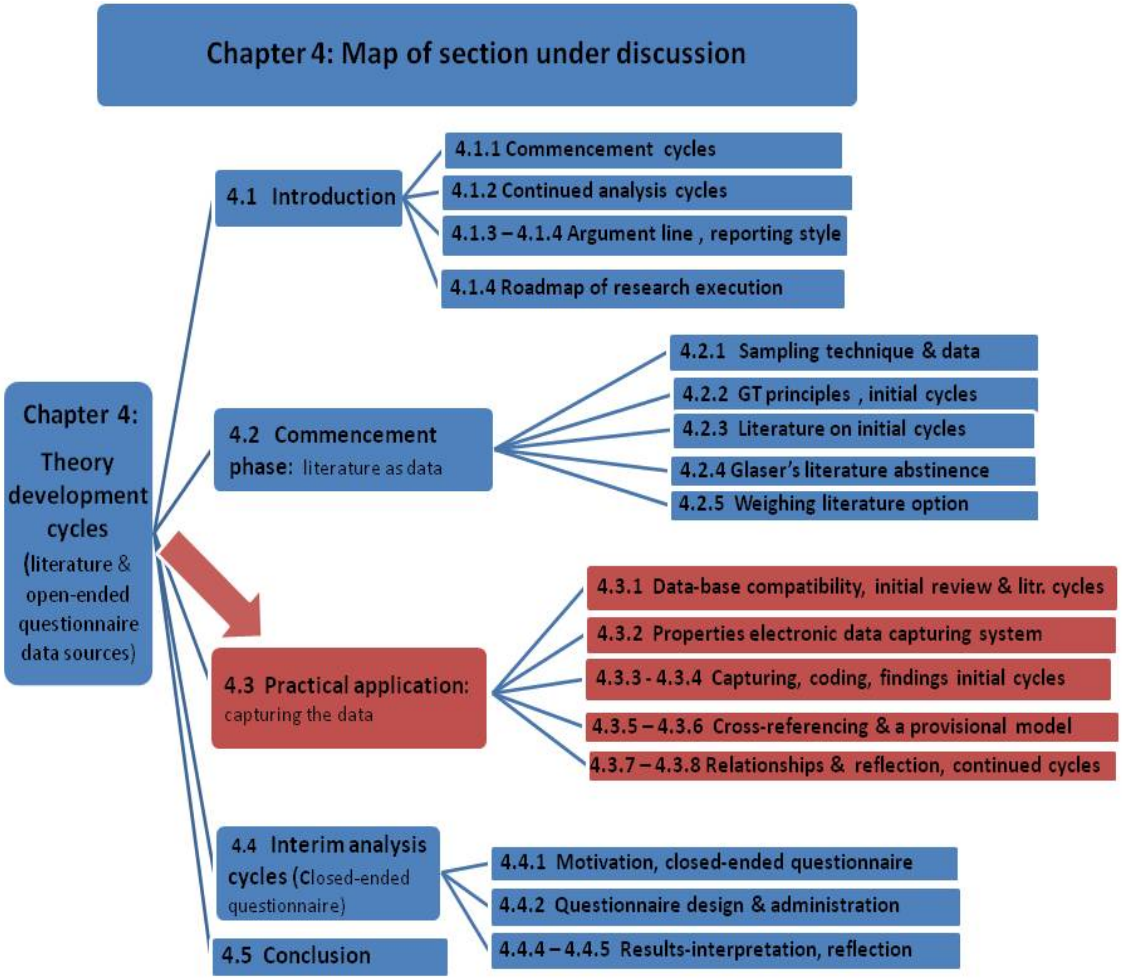
4.2.5 Weighing the context of this study against the guidelines outlined above

The decision of this study to use the literature review (of Chapter 2) as initial data source was also weighed against the general guidelines previously discussed in Section 4.2.2. The concluding findings were that (i) reviewed literature constitutes an acceptable (commencement phase) data source in GT research; and (ii) that the researcher's perception of the relevance of data plays an important role in the selection of a commencement phase data source. The literature reviewed in this study did, according to this researcher's discretion, agree with the criteria of relevance, accessibility, richness and potential to promote theory development. Furthermore, (iii) the purpose of the initial literature review was to identify knowledge gaps in the substantive area; orientate the research (researcher); and identify boundaries to demarcate the research area. Such an objective implied that literature was reviewed over a broad spectrum of the research field: the extent of the review was therefore more general and exploratory than a focused in-depth investigation of a theoretical model for ROP. Furthermore, this review was able to identify – as a knowledge gap – (iv) that relatively little theory development has been undertaken on research output productivity: especially when evaluated from the perspective of a research support statistician who interacts with researchers in the research process (that produces research findings), that is, the material required to submit and publish academic articles. The possibility of pre-conceptions re theory development was therefore

minimal: theoretical models in this field could not be traced. In this instance theoretical bias from the literature would not impact theory development - which was the initial concern of Glaser. (v) Guidelines for a commencement data source also list the richness and relevance of the data source: when research execution began, the initial literature review provided – in addition to set objectives - a wealth of data on events, situations, actions, and factors that impact (or suggest an influence) on article production, article productivity, research output and the process of doing research. According to the judgment of the researcher the initial literature review provided rich, relevant and accessible data that would promote theory development.

The previous discussion motivated the use of literature from the initial literature review as a commencement data source. It was argued that sufficient backing in GT literature exists to justify the literature review of this study serving as initial data source, albeit in a different format. Having attended to the commencement phase data source, attention turns to how collected data from the literature should be organised, captured and coded to apply this knowledge towards theory development. The strategy for coding, capturing and theory development set out in Section 3.6.4.3 now has to be practically implemented. Section 4.2.2 illustrates that the implementation strategy greatly assisted practical research execution.

4.3 Practical research application: capturing the initial data analysis[63] cycles



4.3.1 Compatibility of databases: electronic notes for the literature review and sampled literature when research commences

Although an electronic database of articles that directly or indirectly report on aspects of ROP, for example, research output, article production, article publication, the research process, role players in research, vantage point or interest in research and more, were created and maintained while preparing the introductory literature review for this study, (please refer to Appendix 4.1 for an excerpt of the database) the format of the electronic file and type/extent of the knowledge captured in these notes was not compatible with GT practice that has to provide for or capture simple data events from the researched literature and various levels of abstraction of code. The focus of the electronic notes for the introductory literature review served an entirely different purpose to the needs of the commencement phase of research execution: the purpose of the one action was to introduce a research topic and the purpose of the other was to initiate and stimulate theory development from simple events in the literature. (The simple events and various levels of code had to be 'remembered' to facilitate constant comparison and ensure research integrity).

[63] Analysis in this sense overarches data collection, coding and constant comparison

The option of capturing literature events (for research commencement) to the original literature-review database was thus set aside and focus turned to the compilation of an alternative electronic database that would follow the format set out in the execution strategy discussed in Chapter 3, Section 3.6.4.3. This strategy made provision for data fields relevant to theory development that would preserve critical detailed information. The next section details how the data template strategy of Section 3.6.4.3 was implemented.

4.3.2 Practical properties required of an electronic data capturing system to enhance theory development

When research execution commenced, it was reasoned that in addition to the data template-strategy of Chapter 3, Section 3.6.4.3, an electronic template should ease the following processes:

- The layout should accommodate the cyclic nature of collection, analysis and comparison of GT method. While events are captured (from the literature) in the database the opportunity should exist to compare new events to previously captured events and code – not only data events, but also progressively more abstract conceptualisations (open and substantive code). Fields should make provision for levels of abstraction (Section 3.6.4.3) and the fields should be visible at all times to allow visual (and electronic) comparison. The data fields should mirror progression.
- Therefore, fields should capture the literature data events, references to the literature (to ensure research integrity and allow back-reference to the literature should such a need develop). Several code-fields record the gradual conceptualisation (conceptual code) of ideas and concepts. Table 4.2 illustrates the layout.
- The format of the database should provide for situations where one data-event can suggest more than one concept (e.g., the data incident 'international collaboration' can suggest the way a researcher prefers to work – research practice – or it can suggest the research climate in a department). For this study the decision was taken that two entries would be used to accommodate such an instance.
- The data fields of the database should be designed in such a way as to allow the integration of data from other sources into this database. This would allow constant comparison over a more comprehensive set of code and events. For example, data events from observational field notes and memos could then be integrated in further analysis cycles.
- In accordance with the data template strategy of Section 3.6.4.3 data was captured to an EXCEL spreadsheet (set out with the planned data fields) for the practical reason that EXCEL data is compatible with the SAS analysis system platform and electronic comparison of code and data-events can/would be undertaken with the SAS system. The SAS system (SAS version 9.3) would also be used for further data analysis. Programmatic comparison would ensure that more comparisons could be done more effectively. (For example, code fields were sorted alphabetically in SAS and lists of similar code (e.g. open code), or exact code-phrases, were printed and visually studied. These lists suggested concepts and emerging categories).

4.3.3 The initial cycle of research execution, capturing and coding of data (literature)

Articles and web references used (and captured) for the write-up of the introductory literature review were again accessed, printed, studied (starting with keywords, abstract and conclusions sections before studying the entire article), and data incidents that directly or indirectly relate to research output or productivity/ production/ publication, research process and related issues were

highlighted in the text. Once an article had been studied, the literature-reference and the essence of the highlighted text were captured and coded into the database. Information of a specific article or web reference was entered and analysed before the next article or web reference was studied. Code-comparison and higher levels of substantive code gradually became part of the captured information once more events were captured and more frequent comparisons could be made. This is in accordance with the execution strategy of Section 3.6.4.2 of Chapter 3. Data sampling and analysis were conducted on 72 articles. A total of 1050 records were created.

The process of populating the database is practically demonstrated with reference to six articles used in the write-up of the introductory review and again sampled in the initial research execution. The six articles are by Shin and Cummings (2010); Ynalvez and Shrum (2011; 2005); Waldinger (2009); Buchheit, Collins and Collins (); Mushtaq, Abid and Qureshi (2013); and Zachariah (2010). To support the discussion of the literature database (Table 4.2), some of the events of interest to ROP mentioned in the six articles are briefly summarised in Tables 4.1. For example, Table 4.1 indicates that Shin and Cummings (2010) refer to the fact that the subject-field of a faculty or department affects research output (productivity): some subject fields publish more articles than other subject fields because of the type of field. It might, for example, take more time to generate findings on a new pharmaceutical product with the incorporation of side-effect risk assurance than reporting on an intricate law case study.

Table 4.1: A summary of ROP-related data incidents in six articles to support the description of the electronic ROP database of Table 4.2 and Figure 4.2

This table illustrates the initial 'through process' captured in the literature database illustrated in Table 4.2					
(ii)Lit reference	**Data incidence that affect research output/ productivity/ publication**	**Open code**	**Conceptualisation**	**Concept/ or Category**	**Category attributes/ dimensions**
1. Shin & Cummings 2010	• faculty preference for world class research universities • faculty mission & vision • faculty discipline (some publish more/ more easily) • time allowed for research • work load • research collaboration affects r output • faculty research performance (is this 'climate' ?) • institutional climate • institutional support ?refer to *faculty of department*?	• faculty research preference • faculty goal • faculty discipline • faculty research/tutor load • faculty encourage research collaboration (faculty/ national/ international) • faculty research driven • institutional climate • institutional support	• The notion that '**forces**' or '**environment/s'** impact – the way the **structure of the institution or faculty** work & function: **one or two 'forces/** structures? Or more? • What for example define a 'same force' in the 1st seven open codes; what can be different for this 'faculty force' group?: e.g *policies, *resources *administration,*mentors *collaborators, *human capital; *resources (technical communication will fall here?), *incentives; *funding	• Category 1: **faculty/ dept environment** • Category 2: **institutional environment**	1. **faculty environment** has attributes of - **faculty intrinsic** (subject field, - **administration** (work allocation, research/tutor ratio; monitor research,) - **research climate** (quality mentors, research collaboration, research mindedness, many research outputs, colleagues, mentors, research exposure) - facilitate **research resources** (IT connectivity - facilitate
2. Ynalvez & Shrum 2011:2005	• collaboration • resource constrained context • does funding affect publication? • technical support • program initiatives • program incentives towards publication • training policy – include research training? • administration policy (research admin) affects research output	• (faculty) research collaboration • (faculty & institutional) research resources (constrained or available) • (faculty & institutional)			
3. Waldinger 2009	• quality peer researcher • quality research faculty • quality research collaboration • quality collaboration networks		The last three columns are merged over the seven articles to indicate that all information contribute to conceptualisation and abstraction		
4. Mushtag, Abid, Qureshi 2013	• research training • research capacity – HR thing • faculty research preference • faculty research mindedness • research interest radiated				
5. Buchheit, Collins & Collins	• teaching loads • research support • time allocation • teaching preparation • outside consultancy takes time • research mentor in research • mentor-researcher relationship				
6. Zachariah 2010	• staff turnover • ethics policy: ethics not cleared • lack of funding • lack of infrastructure				

The information in Table 4.1 was electronically captured in Excel data fields, as reported in Table 4.2. The fields were consecutively labelled, 'ref'; 'incidentsThatAffectROP'; 'opencode'; 'Concept'; 'initialCategory'; 'ConceptualCategory'; 'BroadCategory'; 'dimension'; 'Property'; 'TheoryCode'. These fields captured a reference to the sampled publication ('ref' or references); the data-event itself and open code for the event ('incidentsThatAffectROP' 'OpenCode'); increasingly higher levels of conceptual code ('Concept'; 'initialCategory'; 'ConceptualCategory'; 'BroadCategory'); and additional category and relationship information ('dimension'; 'Property'; 'TheoryCode'). (The full reference to articles is reported in the Reference list of this study).

The highlighted entry in Table 4.2, for example, indicates that the literature-event 'Department collaboration inter(national) peers' was sampled from an article by Shin and Cummings (2010) and was open-coded as 'DepartmentCollaboration'. This field was designed to reflect a parsimonious description of the data event. (Code was captured without blank spaces to ease text-reading in the SAS programmes comparing code). This specific example of open code is used to illustrate that international collaboration with peer researchers could be regarded as (i) either a means of doing research (research practice) or, (ii) the way departments support research efforts. The two options are included in two consecutive rows/records (refer to the 'Concept', 'InitialCategory' and 'ConceptualCategory' entries of the two rows) to illustrate that a concept such as 'research practice' or 'departmental impact' can evolve from the same data events when compared to other data entries. The discussion of research collaboration in the literature indicated that collaboration impacts on research productivity and can do so in various ways (how a researcher engages in research, e.g. his/her research practice can advance publication rate; and departmental support for research in the form of research collaboration with national or international institutions can advance research). The collaboration event was therefore data of relevance to the research topic (ROP).

The fourth data field labelled, 'Concept', was completed when comparison with other open code began to suggest conceptualisation. For example, the open code for the event, 'Department collaboration inter(national) peers' in Table 4.2 was interpreted as suggesting either the concept of a departmental climate that impacts on collaboration or it could suggest the concept of international collaboration as a means of doing research (thus research practice). The 'Concept field' was regarded as a higher level of substantive code. This field was often completed once more events that link to the same concept were compared and an idea of a concept verified.

Coding of the subsequent fields of the spreadsheet, namely the 'InitialCategory' and the 'ConceptualCategory' fields was completed in further analysis cycles of the literature data. These cycles leaned heavily on the constant comparison technique and newly generated substantive code was constantly compared to code (open and more conceptual) of earlier collection and analysis cycles. The code entered in the 'InitialCategory' field captured the initial perceptions of concepts/ categories perceived to be the cornerstones (categories) of emerging ROP theory. As findings of the analysis cycles matured, detailed and densified categories termed 'ConceptualCategory' were added and verified. These categories were assumed to be the final building blocks of the theoretical structure of ROP theory. The database was thus able to accommodate and grow theory development.

The data fields in columns 9 and 10 of the spreadsheet in Table 4.2, labelled 'Dimensions' and 'Properties', were not completed in all instances but served as fields to code the dimensions and attributes of categories as and when these became obvious or known. For instance, in the highlighted example used thus far, the coding of more information revealed that 'Department' in this instance could be regarded as a subcategory or dimension of the emerging 'Environment' category. Therefore the 'ConceptualCategory'-field, 'Dimension'-field and 'Property'-field of this incident was respectively coded as 'Environment'; 'TypeDepartment'; and 'ExtentNasInt ' (extent includes national and international educational research institutions). Other dimensions of the

environment category were identified, for example, as institutional-, researcher- and editorial sub-environments.

Finally, column 11 of the spreadsheet, the data field indicated as 'TheoryCode', records suggestions of relations/relationships between conceptual code and, therefore, captures theoretical code. The suggestion that the departmental environment forms a sub-category of the environment category implies a relationship between the general concept of environment and departmental environment, therefore the link could be expressed as theoretical code ('department stands in a hierarchical relationship to environment category and other sub categories of environment') in the 'TheoryCode' data field.

Comment

Categories refer to constructs or themes or variables of relevance to the phenomenon studied (Dey 1999:52-56; Gibson and Hartman 2014:68-70); properties/ or dimensions refer to characteristics of categories which give meaning to categories (Strauss and Corbin 1998; Gibson and Mills 2014:69) and explains the extent of these attributes within a category (Dick, 2005; Dey 1999:52-56).

Table 4.2: An excerpt of the commencement cycle literature database illustrating how the database was populated

ref	incidentsThatAffectROP	opencode	Concept	initialCategory	ConceptualCategory	BroadCategory	dimension	Pro-perty	TheoryCode
Shin&Cummings, 2010	Disciplines' output rate differ	DepartmentDiscipline	Discipline	DepartmentImpact	DepartmentImpact	Environments	Department		
Shin&Cummings, 2010	Department Research preference	DepartmentResearchPreference	ResearchPreference	DepartmentImpact	DepartmentImpact	Environments	Department		
Shin&Cummings, 2010	time on Research	ResearchTime	timeAllocation	DepartmentImpact	DepartmentImpact	Environments	Department		
Shin&Cummings, 2010	Department collaboration int peers	DepartmentCollaboration	CollaborationDeptImpact	DepartmentImpact	DepartmentImpact	Environments	Department	Extent NasInt	DeptSubCategoryOfEnvironment
Shin&Cummings, 2010	Department collaboration int peers	DepartmentCollaboration	CollaborationInterntnlRPractice	RPracticeCollaborationInterntnl	RPracticeCollaboration	RPractice	Collaboration	International	
Shin&Cummings, 2010	Department teach/Research load	DepartmentTeachResearchLoad	teachResearchLoad	DepartmentImpact	DepartmentImpact	Environments	TypeDepartment		
Shin&Cummings, 2010	Institutional goal/mission	InstitutionMission	mission	InstitutionImpact	InstitutionImpact	Environments	institution		
Shin&Cummings, 2010	Individual staff member	ResearcherFactor	ResearcherCharacteristics	ResearcherImpact	ResearchImpact	Environments	research		
Shin&Cummings, 2010	Department recruit policy	DepartmentRecruitPolicy	policyRecruit	DepartmentImpact	DepartmentImpact	Environments	Department		
Shin&Cummings, 2010	Personal preference for Research	ResearcherReseachPreference	ResearchPreference	ResearcherPreference	Preference	Environments	research		
Shin&Cummings, 2010	personal ability do Research	AbilityResearcherDoResearch	AbilityDoResearch	ResearcherSkills	Skills	Environments	research		

4.3.4 Preliminary findings derived from analysis cycles using the literature

The process of collecting, coding and comparing literature data events described in the preceding section proved to be a rewarding exercise since the first suggestions of emerging code bore testimony to the fact that GT method indeed 'worked' and that coding gradually grew to suggest more conceptual and abstract ideations. These concepts could sensibly be named. Although the process was slow and time-consuming, suggestions of concepts could be clarified, further refined and, in some instances, verified in additional cycles of literature sourcing, coding and comparison.

The code-entries in the *'Concept'* (conceptualisations) and 'i*nitialCategory*' (category) data fields gradually began suggesting categories of the emerging ROP theory. Although additional theoretical sampling (from other data sources) was still required, the concepts and provisional categories that began emerging at this stage seemed viable and could be explained. These concepts and/or provisional categories are listed in Table 4.3 and are visually illustrated in Figure 4.2. As will be explained in the next section, Section 4.3.5, programmatic comparison of the listed concepts in Table 4.3 (as well as *initialCategory* and *Concept* data field entries) to subsets of literature data events (please refer to Table 4.4 and Appendix 4.2) refined and strengthened suggested ROP categories that would form the cornerstone-categories of developing ROP theory.

The previous paragraph not only reported on initial theory development in terms of emerging concepts, but also addressed the question intermittently asked of research execution, namely, whether the technique of GT succeeded in advancing theory development. The deduction at this stage of the research could be made that the first elements of theory, namely constructs, or concepts were indeed emerging (Table 4.3). Concepts such as 'role players'; 'research practice'; and 'statistical literacy' suggested in analysis cycles, for example, agreed with observational field notes of the researcher of this study. For example, a field note[64] recorded in 2012 (15-05-2012) read:

> *Researcher X has a very solid understanding of the basic principles of factor analysis and is capable of interpreting [statistical literacy] and integrating the findings of the statistical report into the article: this is superb! The article reveals a deep subject knowledge [subject specific knowledge] and statistical insight [statistical literacy]: joy to read. Not to worry about the stats section of this article – does not 'stand out' blends in neatly with the rest of article.*

The article was returned once for minor language flaws and published within seven months of submission.

This narrative illustrates knowledge or the capability to interpret statistical findings and integrate such findings into a research article and would thus indicate statistical literacy. This concept was identified independently in the literature database and the field notes – an additional data source - which confirmed the concept of statistical literacy. The further question at this stage was whether statistical literacy should be considered a stand-alone category or part of a more comprehensive ROP category (higher level of conceptualisation).

Comment:

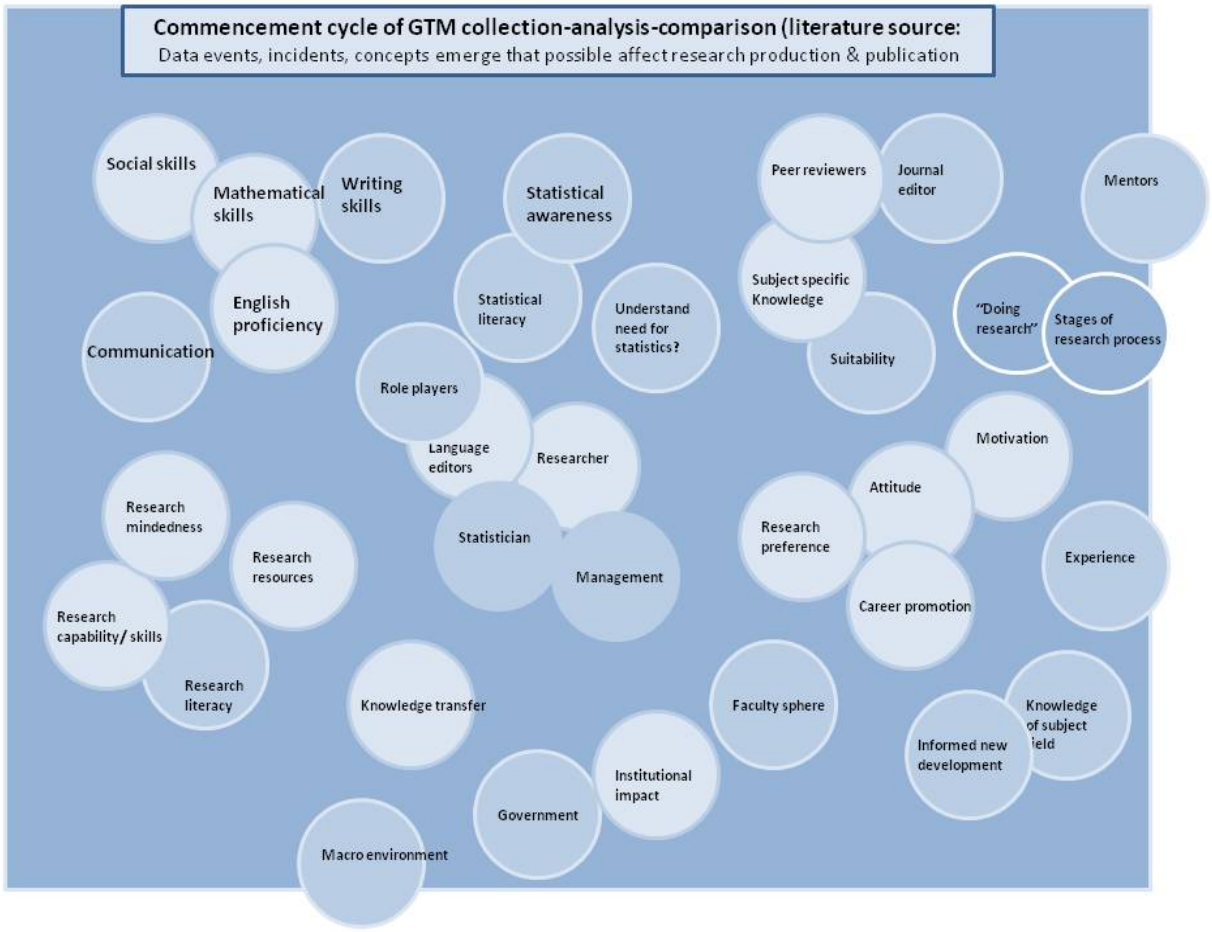
[64] The field notes were recorded by this researcher during statistical support activities to researchers who published research articles that this researcher co-authored. A total of 34 articles.

The above example also illustrates how additional data sources were sampled theoretically as and when the need to further clarify or verify a category or conceptualisation arose. In the previous example this proved a very rewarding practice.

Table 4.3: A summary of concepts that emerged from the analysis cycles of literature in the commencement phase of research execution

Most prominent concepts identified during coding and constant comparison of the cycles of literature-sourcing, coding and constant comparison	
*Attitudes	* Need for statistical knowledge
*Attributes/ characteristics	*Peer reviewers
*Biological properties (attributes/ characteristics/ skills?)	*Publication savvy/ awareness
*Career promotion (work conditions?)	*Researcher
*Collaborate, collaboration	*Research centre (not resource centre)
*Communication (method and skill?)	*Research climate; work conditions; performance agreement
*Data; data integrity (ethics?)	*Research/er environment
*Departmental sphere/ impact (Faculty?)	*Research literacy (research savvy?)
*Development (two types: self/ science?)	*Research mindedness (research savvy?)
*"Doing research" (research practice & -process?)	*Research practice ("doing research?" & research practice, of separate categories?)
*Editors' editorial impact	*Research preference
*English proficiency	*Research related processes
*Environment	*Research process
* Ethics/ ethical process	*Research resources
*Experience	*Research role players
*Funding (resources?)	*Research skills
*Government	*Research minded (research mindedness)
*Institutional impact	*Research teams/ teamwork
*Knowledge	*Teamwork
*Knowledge transfer (communication?); Training; write-up	*Resource centre
*Language editors	*Role players (research role players)
*Macro environment	*Social skills (researcher skills?)
*Management	*Statistical awareness (level of stats literacy?)
*Methodology	*Statistical literacy
*Mathematical skills	*Statistical thinking (skills or literacy?)
*Motivation (inner drive or incentives?); attitude?	Statistician (research role player)
*Mentors	*Subject knowledge (knowledge)
*Need information to develop	*Suitability (techniques? Research questions?)
	*Writing skills

Figure 4.2: A visual presentation of Table 4.3



4.3.5 Clarifying Table 4.3 concepts and higher order code by means of cross reference tables (higher order code by open code)

Constant comparison by means of SAS-generated two-way tabulations

Initial research succeeded in identifying the listed concepts of Table 4.3. The discussion in section 4.3.4 however also indicated that research – at this point – was still undecided about which concepts represent standalone categories (e.g. statistical literacy) and which concepts form sub-categories or dimensions of more comprehensive and overarching categories of ROP theory.

*The r*esearch suggested that additional theoretical sampling would, at this stage, support category identification and densification (and this was also undertaken), but, at the same time, it was reasoned that information contained in the database of sourced literature should be optimally utilised. To this end constant comparison was taken a step further by programmatically comparing each of the concepts listed in Table 4.3 against subsets of open-code, and separately also against subsets of initial data events that linked to a specific listed concept (e.g. all open code or initial data events that suggested 'researcher skills'). Cross tabulations, comparing a specific concept against either subsets of open-code or subsets of initial data events, were compiled using SAS software version 9.3. It was argued that listings of open code entries per conceptual code entry or concept would describe, inform and assist in classifying (even if only provisionally) a concept as either an emerging category or property or a dimension of a category. In this way comparisons would assist in

identifying the nature of concepts listed in Table 4.3. As part of the same exercise, subsets of open-code or initial data-events entered against every *'Concept'* as well as each '*initialCategory*' entry in these data fields of the literature database were also cross-tabulated, printed and studied for the same purpose.

The reasoning behind this programmed comparison was that the number of entries for increasingly more abstract levels of code (e.g. 'open-code' entries compared to 'initialCategory' entries) decreased considerably as abstraction increased. This is due to the fact that several 'initial data events' or 'open-code' entries, for example, jointly suggest a single and more abstract level of code (e.g. a total of 1050 'initial-data-events' entries suggest 42 different '*ConceptualCategory'* data field entries). By cross referencing, for example, the 'initial-data-event' or 'open-code' data fields with higher substantive code data fields, comprehensive sets of 'open-code' or 'initial-data-events' per conceptual code entry are obtained (Please refer to Table 4.4 that reports 'open-code' associated with the concept of 'attitude' in the greater cross-reference exercise of 'open-code' by 'ConceptualCategory').

It was argued that these types of tables provide a descriptive definition of the relevant construct and that details of these concepts, e.g. the dimensions of a category, are explained by the lower level code entries. For example in Table 4.4 the 74 open code entries associated with 'attitude' suggest that the concept of *attitude* represents a standalone category and that the subset of open-code in this instance densifies (Kelle 2007:192-196) the *attitude*-category by identifying *attitude* dimensions of: attitude towards statistics; attitude towards 'doing research'; attitude towards other research role players; attitude towards research support and services; attitude towards continued (skills) development; and attitude as personal motivational effect. All of these dimensions potentially influence how a researcher approaches and conducts his/her research, which, in turn, eventually impacts on research publication (e.g., the open-code entries, "*MustUnderstandStatisticalPrinciples";* *"AttitudeColleaguesHaveOfOwnTalent";* and *"AttitudeEnjoyWork";* respectively suggest dimensions of attitude towards statistics, other role players and personal motivation).

Table 4.4: The concept of *attitude* cross tabulated with data events from the literature review data source that suggest attitude

Open code under conceptualCategory code of ATTITUDE (that impact ROP)	Structuring of listed data events to define and densify the suggested category of ATTITUDE	Summary of critical concepts that suggest dimensions of the category or independent conceptualisation
MustUnderstandBasicStatisticalPrinciples	**Attitudes regarding:** • **Statistics** o *Statistical awareness* Statistics important Stats attitude affect productivity o *Statistical knowledgeability* Quantitative/qualitative r types Stats findings have practical application Understand statistics, principles o *Statistical literacy* Stats self-efficacy Technique decisions based on knowledge • **Research role players** Colleagues needed Colleagues own talents • **Research practice** Collaborate colleagues, rewarding, opportunities Research ability/ capability • **Research support, availability** Statistician for analysis, experts available Research resource centres • **Development** Statistics courses needed • **Personal research attitude** Enjoy research, motivated Confidence research ability, statistics Entrepreneurial research approach Research is hard work & involves risks Positive attitude research, statistics	**Attitudes regarding,** • **Personal attitudes** • **Availability resources** • **Statistics** • **Role players** • **Research practice** • **Development**
QuantitativeQualitative		
StatisticianForAnalysis		
StatisticsCoursesNeeded		
StatisticsImportant		
StatsFindingsHavePracticalApplications		
StatsSelfEfficacy		
TechniqueDecisionsBsedONKnowledge		
AttitudeCollaborationConfidence		
AttitudeColleaguesNeede		
AttitudeColleaguesOwnTalent		
AttitudeEnjoyWork		
AttitudeRAbilityConfidence		
AttitudeResearcherEntrepreneurial		
AttitudeUnderstandStatistics		
AttributesResearcherHardWork		
AttributesResearcherRisk		
CollaborateMotiveExtrinsicReward		
CollaborateMotiveOpportunities		
EnjoyResearch		
GeneralStatsAttitudeAffectProductivity		
MotivationProductive		
ResearchNotAppreciated		
ResearcherConfidenceAttitude		
StatisticalConfidence		
StatisticianInSupportResourceCentre		
StatsiticalSelfEfficacy		
ThinkKnowMethod		
ThinkStatsExpertToInterpret		
Total		
Total number of entries = 74		

The output from the above-described cross-reference exercises is voluminous. For this reason, the cross reference tables that were insightful are reported in Appendix 4.2 of the General Appendix section. These tables, labelled Tables 4.2.6 to 4.2.28, report on cross tabulations of the '*ConceptualCategory*' data field (a total of 42 'conceptualCode' entries) and the 'open-code' data field in the literature database. Each table reports the number of 'open-code' entries that link to a specific conceptualisation (e.g. Table 4.7 reports on open code entries that link to the concept of '*Attribute, skills and competencies of researchers* '). By sorting and studying the open code entries of each cross tabulation in Tables 4.6 - 4.28, the deduction could be made that programmatic (constant) comparison greatly contributed towards (tentatively) identifying 12 ROP categories and 31 concepts that describe dimensions and properties of categories or relational links between or within categories. Several other combinations of cross tabulations were executed but the tabulations reported in Tables 4.6 – 4.28 proved to be the most informative. Table 4.5 provides a summary of the Appendix 4.2 tables

Table 4.5: A list of cross-referenced tables (included in Appendix 4.2) of emerging concepts and subsets of data events – sourced from the literature – that link to these concepts

Tables included in Appendix 2.1 (General Appendix)	Emerging concepts that were each cross-tabulated with data events from the literature that suggested links to these conceptualisations. The concepts are listed in table-sequence order.
Tables 4.7 to 4.28	*Skills, competencies and attributes; biographical properties; collaboration; communication; data/ or information; training; differences; English proficiency; environment; departmental impact; editorial effect; experience; institutional vantage point (environment); knowledge; global/ governmental perspective (sub-category of environment category); managerial impact (subcategory of role players?); motivation; publication savvy (a subcategory of the knowledge category?); funding; human resources; information access; internet access; methodology; research climate; research resource centres and research mindedness; research/ researcher environment; research practice; research process; research resources; research role players; research teams; research skills; statistical awareness; statistical literacy and statistical training*

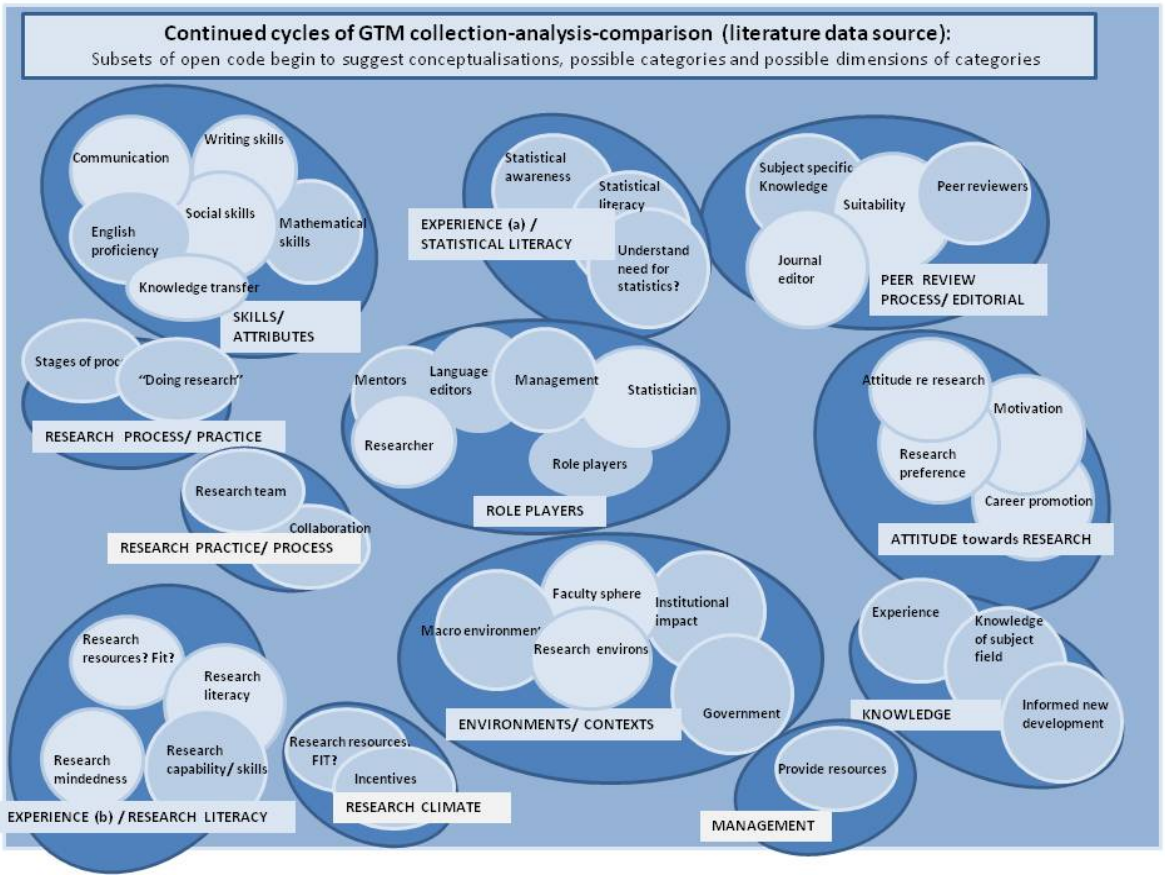
Summarising findings derived from the programmatic comparison exercise

- The programme to compare open and conceptual codes proved to be an effective way of continually comparing (constant comparison) 'older' and 'more recently' coded events: the listings of subsets of lower level code associated with specific higher level code entries aided the clarification and definition of particular concepts and categories (even if initially provisionally).
- The cross-reference comparisons provisionally identified 12 of the original 'conceptualCode' entries as categories and the remaining conceptualisations (Table 4.6 - 4.28) as dimensions, or properties, or relational links. The provisionally suggested categories included:
    - Research climate in which the researcher functions and works
    - Management
    - Editorial/ review process
    - Research resources (and research resource centres?)
    - 'Doing research' (research process and practice?)
    - Research practice (and process?)
    - Attributes (separate from skills and abilities?)
    - Attitude
    - Knowledge and development
    - Experience
    - Environment (global, institutional, departmental, research environments/dimensions?)
    - Research role players (separate category from research process?)
- The emerging conceptualisations and continued comparisons at this stage seemed to suggest that different types of categories might be involved in the process of doing research and on the subsequent delivery of research output. This would imply that different types of categories stand in different relationships to one other, to the research process, and to successful article publication. For example, some dimensions of the identified environment category seemed to affect a broad scope of research activities (e.g. institutional dimension) - a kind of underlying/ or overarching relationship and influence on research activity; whilst other categories, e.g. skills or abilities of researchers, appear to impact on specific aspects of the research process or article publication. For example, English proficiency affects how effectively the write-up of research findings proceeds, while statistical literacy on the other hand is instrumental in research

planning, execution and interpretation of analysis results and the incorporation and interpretation of statistical findings in subject field context. Furthermore the effect of certain categories might impact on ROP more indirectly (institutional environment) while other categories might impact more directly (e.g. writing skills).

These findings indicated that basic cornerstones of theory were emerging but additional input was still required. An indication of how ROP theory had developed up to this stage is illustrated in Figure 4.3. The diagram indicates that subsets of lower-level code suggest higher-order conceptual code or concepts. Some of these concepts were more easily identified as ROP categories and dimensions while the role of other concepts was still somewhat unclear. In the next section a more detailed explanation of the theoretical ROP framework is provided in Table 4.29.

Figure 4.3: A diagrammatic presentation of theory emergence: concepts cluster into groups that explain categories, or dimensions and attributes (of categories), or relationships



4.3.6 A provisional model of theory development on ROP

A first, although very tentative, attempt at a structured description of the development of a theoretical model of ROP is presented in Table 4.29 and Figure 4.5. This framework aims to incorporate the various emerging categories and concepts into a self-explanatory logical structure. In this way emerging categories are named and defined and guide further analysis cycles by indicating areas of uncertainty and possibly ambiguous concepts. For example, concepts and ideas that do not necessarily suggest standalone categories or dimensions but rather suggest areas of importance and relevance to *research output delivery* as well as areas of uncertainty were noted. The objective of

this framework was therefore to define emerging categories and dimensions; pinpoint areas of uncertainty to be further investigated and clarified; and consider relational links between and within categories: a first attempt at theory description.

The first column of Table 4.29 labels the specific ROP category (listed in Section 4.2.5) suggested by open code and initial data-events entries. An abbreviated overview of these entries is reported in the last column of the table. The second and third columns of Table 4.29 record emerging/suggested dimensions of the particular category as well as links or relations suggested by developing theory: rudimentary theoretical code. Issues that need further clarification are also noted in column 3.

A discussion of the *research climate* category is detailed in a row entry of Table 4.29:
The row-entry for *research climate* lists events in the last column that suggested this category, namely, *encouraging; collaborative; supportive; cooperative; sharing; motivational attitude; competitive ; productive; open-minded; research minded; importance of relationships; status as recognised research university; research preference; research policies; research leadership; political will towards research; research-teach balance; research culture; research networks; research experience; experienced/ quality role players (management & colleagues/peers in environments); role players' example; research driven; manage/ control administrative work conditions; remuneration; functional administrative infrastructure; and functional research infrastructure.*

Against the literature reviewed in this regard, scrutiny of these codes defined the *research climate* of a researcher in terms of a research-focused environment (knowledgeable, supportive colleagues, management, resources and infrastructure) and favourable research work-conditions. Several *research environment* dimensions were suggested, namely:

- Collegial research-attitude and goodwill: colleagues that support, inspire and motivate fellow and young researchers
- Research-related conditions: the status of the institution as recognised research institution, research policy, research preference, research leadership; political will to excel in research and the like
- Working conditions: work load, teaching loads, research time, research assistants, excellence awards, etc.

The literature sourced in the initial analysis cycles indicates that a favourable research climate stimulates research efforts and research output.

The definition of the *research climate* category summarised as the first row entry in Table 4.29 furthermore suggests that the *research climate* of a researcher can be influenced by different forces or environments: *role players* in the research environment; *managers* in the institutional environment; perceptions of global researchers focused on institutional research credibility, etc. These suggested influences implied in the definition of a *research climate* provide a clue to emerging theoretical code: an example would be that the *research climate* of a researcher is influenced by the greater *environment* (also defined as a ROP category in Table 4.29 of this study): institutional policy may favour research in specific subject fields; or may be focused on tuition and not on research. In both instances, the research climate of a particular researcher may be unfavourable for research production (e.g. interest of the researcher falls outside the flag-ship research areas of the institution,

or a heavy teaching work load hinders research practice). Reasoning followed in this regard, for example, asked how the relationship between *environment (*also identified as a ROP category) and the *research climate* category should be described: are only specific elements of the *research climate* affected by the *environment* category or is the *environment* category an effect that impacts all facets of the *research climate* of the researcher? Likewise a link with *role players* (in later cycles defined as a stand-alone category) and *management/ or managers* was observed. These relational links are noted as potential theoretical code in Table 4.29.

Table 4.29: The preliminary theoretical framework of emerging ROP theory derived from the analyses of the initial literature-review data source

Indications of relational links are indicated in column 3. Issues that require further investigation is indicated throughout the framework **Categories identified include: *Environment; research climate; management; motivation; research resources; research-related processes; knowledge; development; attributes; attitude; skills***			
Construct/ Category	**Subcategory/ Properties**	**THEORETICAL CODE**	**Definition as described by open code and initial data events.** (The initial suggestions of possible links and theoretical code originates from this code and higher levels of substantive code)
Research Climate	• ***Approach/ attitude of role players*** • ***Research background / conditions*** • ***Work conditions/ employment conditions***	**Theoretical code:** *Research climate* interacts with ***environments*** & ***management*** & ***role players*** **Issues that require further clarification**: **Should management be a dimension of role-players category, or separate structure-like category? **Do *role players* form a separate category? for now resorts under *research process*. Indications are separate category	***The research climate defined in terms of how the category impact ROP*** *(Environments applicable: Macro/ institutional / departmental/ editorial/ research environments;* *role players: management/ managers/ colleagues/ HR/ reviewers/ editors/ etc)* • ***Approach/ attitude role players*** (encouraging, collaborative, supportive, cooperative, sharing, motivational attitude; competitive , productive, open-minded, research minded, importance of relationships, • ***Research background/ conditions*** (Status as recognized research university, research preference, research policies, research leadership; political will towards research, research-teach balance, research mindedness, research culture, research networks, research experience, experienced/ quality role players (management & colleagues/peers in environments), role players' example, relationships; research driven; manage/ control admin/ work conditions, remuneration: functional administrative infrastructure; functional research infrastructure • ***Work conditions/*** (Work load, teaching load, research time; research assistants; post grad students; collaboration opportunities; self development opportunities)

Management	• **Facilitates** • **Motivates, monitor** • **Guides**/ determines direction of research	**Theoretical code:** • ***Management*** *interact with* ***environments*** *category* • ***Management dimensions*** ▫ **Facilitates** ▫ **Motivates, monitor** ▫ **Guides**/ determines direction of research ***Issues for further investigation:*** ***management*** rather dimension, role players no standalone category? ** Do role players form separate category?	• ***Facilitates research / provides research climate*** o***Physical work conditions*** (teach-research workload; time allocation; min outside disturbance; research administration infrastructure; student/staff ratio; dept size; talent management; recruit policy; capacity; favourable conditions of service, workload policy; supervision; recruitment & retention policy (quality researchers, good remuneration, appointment conditions) o ***Physical research support*** (Provision research resources (research instruments); Funding ; Research resource centre (statistician, stats services, data capturing, language editing, survey field workers); IT infrastructure; research infrastructure; technical/ IT resources (support & application packages); resources availability & accessibility; resources maintenance & upgrade) o ***People support/ role players support*** (Enable other people to support research: mentors; colleagues; peers; statisticians; research teams; national/ international collaboration & networks; snr colleagues; collaboration opportunities o ***Developmental/ knowledge support/ opportunities*** (Research exposure: research exposure (research collaboration(snr. colleagues, research teams, co-authors; co-research opportunities, mentors, conference attendance/ papers, networks); Training/ development: subject knowledge, statistics, research, professional development; encourage qualifications)
			• ***Motivates to do research & monitors research*** (Promotions, incentives ("incentives increase productivity"), remuneration, awards, performance driven management; management expectations (monitor research, compliance contract requirements); academic/ international recognition, pressure to publish; performance measure to publish; promotes academic status; monitors research-project progress;
			• ***Guides research / determines research undertaken*** (Research objectives; research preference; research policies; research leadership; research directions via research flagships/ flagships institute, government, department, research mindedness/ awareness;
Research Resources, (services & support "research enabling environment")	***Types of resources*** • ***Research infrastructure*** • ***Physical research support*** • ***Knowledge access*** • ***Work/ research conditions***	**Theoretical code** • ***Research resources*** *interact with* ***environment*** *category* • ***R Resources*** *include dimensions of* o ***infrastructure;*** o ***work conditions,*** o ***physical support*** o ***knowledge access*** o ***Research/ work conditions*** **Issues to investigate further** **Resource centre part of physical research support? yes ***Is R resources a sub-category of knowledge or stand-alone category? Rather stand-alone***	***Types of resources*** • ***Research infrastructure*** (IT needs: e-mail, internet to network, access to internet; research admin-infrastructure. • ***Physical research support*** o (funds, equipment, o communication network: software & IT needs, o technical support; o development opportunities (Training, exposure research environment: conferences, co-author, co-researcher, interact snr researchers); o research resource centre (increase ROP; Share resource centres nationally/ internationally; with, ▪ & Research support services: statisticians, statistical services; mentors; expert advice re design & plan; advice & support re research execution; fieldworkers; support re data capturing; support re data validation & integrity; data analysis & interpretation training, research assistants, research administration assistance , language editors; statisticians) • ***Knowledge access*** (library, internet, colleagues, conferences, • ***Physical work conditions/ research enabling environment*** (Managerial goodwill & support; research leadership & flagships ; hours, work load, contract conditions include research, department size, student/ staff ratio, r capacity, staff retention strategy; staff recruitment strategy; recruit appropriate staff, physical r admin support, research teams, mentors,

Motivation (driving forces)	• ***Motivational drivers***	**Theoretical code** • ***Motivation*** *interact with* ***environment*** • ***Motivation*** *interact with* ***management*** *category* • ***Dimensions of motivation*** o ***Drivers*** ***Further investigate:*** ***** Motivation an attribute/ Mindset? – rather part of attitude***	***Drivers/ forces,*** ▫ ***Intrinsic researcher motivation*** ▫ ***Academic recognition*** *(recognition in academic circles, NRF rating,* acclaim, ▫ ***Incentives/ rewards*** (publication incentives paid out, remuneration, awards, conference attendance, financial gains, incentives increase ROP, ▫ ***Performance & promotion opportunities*** (Career promotion, comply appointment conditions ▫ ***Example of performance of peers/ colleagues*** *(example of peer-performance motivates* ▫ ***Expectations within environment*** *(publish required by management/ institution, appointment-requirement, career performance criterion* ▫ ***Research supervision & monitoring*** ▫ ***De-motivators:*** *ethics applications; funding applications; research application; research admin* • ***Intrinsic researcher motivation***

Research-related processes	**Research process** dimensions of • structure • role players	**Theoretical code:** • ***Three processes separate categories?*** • ***Or rather integrate into one research process category?? Seems rather one category*** • ***Research process very important*** • ***R process*** *interact with* o ***environment,*** o ***management,*** o ***research support;*** o ***knowledge/ skills*** o ***development*** o ***motivation*** o ***attitude*** o ***attributes*** o ***r practice*** **Issues to investigate:** ***Role players a separate category? Yes believe so – but test questionnaire *** Teamwork; team approach part of research practice category *** Role players (internal/ external to research process) separate category?	***The research process structure*** ▪ ***Formulate research objectives and questions*** **(**clear on direction; formulate objectives) • ***Plan & design*** (Knowledge research design; sampling; insight research paradigm & methods/ methodology, assumptions; stats techniques to plan analysis strategy; stats/ scientific assumptions to adhere to; logical thinking) • ***Execute & collect*** (methods: correct application; data: reliable, accurate, quality, verify data) • ***Analyse & interpret*** (Correct, quality, accurate techniques, interpret & logical thought/ reasoning, wrong interpretation; • **Write-up & submit** (manuscript preparation; Logical trail of thought, write-up; ***Role players in research process*** • Role-players/ Members (Research team members & leader, academic/ research networks; mentors; quality, experienced colleagues; statisticians; solo-researcher, or team leader & co-researchers, statistician; fieldworkers, management, resource centre • ***Attributes/ Characteristics of team members*** (leader/ and members: Experience, knowledge of research, research leader; professional conduct; accept role-responsibilities, consult & seek support. Quality team more effective than individual; teams develop together; effective team have quality members; effective teams apply each members optimally; effective team focus/ stay focused on goal; knowledge-able;' • ***Role & responsibilities*** How: mentor, write, design, plan, implement, co-author; joint expertise; participative & sharing knowledge; clear/ assist in ethics application; work ethically; participative attitude; attitude research preference; work according to research process/ know research process; prepare manuscript; statistician responsible appropriate techniques & interpretation (consult: quest design, r design; sample, administer; do analysis, interpret, feedback, edit); leader coordinates; leader informed in research; leader informed technical detail; leader ensure resources available top work; ethical conduct; correct application; think logically (), teamwork; accountability;; supervise ; communication; knowledge transfer

	• Ethical clearance process	**Issue:** Ethical conduct part of research practice? Yes	• Ethical clearance. Ethical conduct; ethical research; integrity in research – where do these belong? But that is why ethical clearance is done to ensure these
	• Editorial/ review process	•	• *Manage & administration* *(received submissions/ resubmissions, initial evaluation against journal objectives, decide on reviewers, follow-up on reviewers, return/ reject manuscripts, correspondence, appoint reviewers, reviewer guideline, time line)* • Manage &administer printing process (time line, publisher, publisher/journal language editor, final print copies: revision)

Research practice	• communication • teamwork & collaboration • knowledge • development (part of knowledge?) • habits • use resources	**Theoretical code** • ***Research practice & research process*** *interact* • or, ***research process*** *dimension/ sub category of* ***research practice?*** • ***Research practice interact researcher attributes*** **Issues:** *** Separate category? *** Ethical conduct rather part of research practice? Yes	• Communicate • Co-ordinate research activities • collaborate • Ethical conduct; ethical research; quality research • Quality; reliability; validity; trustworthiness • networks; communicate; info exchange; interact; interdisciplinary; r teams; mentor; meet; networks; communicate; info exchange; interact; interdisciplinary; r teams; mentor; meet; & ***Team members, roles, responsibilities*** (accountability; co-author; leader and members; required to be knowledgeable; mentor; meet; supervise and monitor; same interests; share knowledge grows; accept responsibilities, communication, dispute resolutions, leadership, positive group climate; problem solving approach in group, interpersonal skills/ relationships

Attributes of researchers	• Types ▫ intrinsic success/ motivational traits ▫ work habits ▫ academic traits ▫ biographical traits ▫ research practice traits (research team member & collaborate) ▫ knowledge, experience & skills ▫	**Theoretical code:** • ***Attributes*** *an independent category* • ***Attributes & environment*** *(research) interact* • ***Attributes*** *(work habits/ research practice) interact with* ***research practice*** **Issues:** *** Motivation should move here - a motivational mind set (not an attitude?) *** **Rather include SKILLS here? Not part of Knowledge??** **seems logical alternative	▫ ***Intrinsic success/ motivational characteristics*** (Has initiative, creative, enthusiastic/ motivated/ high energy, research orientated , research preference, committed, objective, open-minded, high morale ▫ ***Work habits & research practice*** (accurate, orderly/ systematic analytical mindset, curious, , persevere/ tenacious, work hard, independent thinker, intrinsic motivation, participative & collaborative, willingness to share; leader in r field, risk/ not perfectionist, devout ample time to research, use research resources, interact, international network/ interaction/ exposure, work with others; experience in team research, accept team role responsibility,) ▫ ***Biographical traits*** ***(***age/ professional age, gender, dependants, marital status, intellect ▫ ***Academic traits*** ***(***qualifications, quality Ph D, academic affiliations, career position, academic rank, academic background: research training/ -experience/ -literacy/- exposure &- mobility, train/ develop continuously, statistical literacy, thus, experience, knowledge & research practice, doctoral students, ▫ ***Knowledge (& experience & skills), knowledgeability*** (experience: editor, research, writing, peer reviewer, publishing exp; statistical; research & statistical literacy, r team experience; active in research; ,

Attitude of researchers	**Types of attitude/ perceptions** • mindset towards research • mindset towards statistics • realize need knowledge & exp • realize must develop knowledge • realize support exits • willingness to develop • realize/ willingness follow r practice • realize research is a process	**Theoretical code** ▪ ***Attitude is*** *separate category* ▪ ***Attitude & environment*** *(research*) interact	▫ ***Positive mindset re research*** (enjoy research, open-minded, preference for research, research is entrepreneurial, accept responsibilities, research is collaborative/ participative/ teamwork, research-ability promotes r confidence, research implies hard work, if r motivated then productive, attitude of confidence promotes productivity, value of experience; conviction that research-ethics is important; realize that doing research is a process; research awareness; statistical awareness; willingness to develop & experience research abilities & exposure; know/ realize that researchers have access to support systems/ resources)
			▫ ***Positive mindset towards stats*** (research relies on stats, stats important, understand basics of stats, stats competencies/ awareness/ efficacy creates r confidence, realize stats findings should be interpreted i.t.o. practical study context, realize techniques & research question-type related, stats attitude affect r productivity, must know which methods appropriate, must be able to interpret stats (own or statistician), These last mentioned culminate in stats literacy that is important
			▫ R***ealize require knowledge & skills*** (subject knowledge, research knowledge: e.g. quantitative/ qualitative, methodology, r designs, , experience, publication/ editing knowledge, statistical knowledge: basic principles/ assumptions to more advanced statistical principles,
			▫ ***Realize must develop/ skills required/ willingness to develop*** (realize needs research/ statistical/ publishing/ writing/ Eng experience & skills; need training courses , exposure to research, interaction/ networking colleagues, research role players aid development (colleagues, mentors, statisticians,)
			▫ ***Realize research support services exist & when to use*** ***(****realize various expertise required in research,* quantitative/ mixed, stats support & statistician: questionnaire, analysis , interpret, analysis techniques & r questions
			▫ ***attitude towards research practice*** (realize r is hard work, realize r is 'risky', r is collaborative, but collaboration opens up opportunities, realize shared knowledge (collaboration) creates new knowledge, research is a process, has to know research process/ research literacy

Knowledge	• **Formal Knowledge /theoretical knowledge** **What about statistical knowledge, subject knowledge?** • **fields/ type** ▫ subject ▫ research ▫ stats ▫ publish	**Theoretical code** ▪ ***Knowledge*** *is a separate category* ▪ ***Sub categories*** of knowledge include. ▫ ***formal knowledge*** ▫ ***experience/ applied knowledge*** ▫ ***skills & competencies*** To investigate: ▪ *Experience, skills dimensions of knowledge?* ▪ ***SKILLS rather attribute****? More logical* • *Knowledge interacts with environment (research environment)*	***Fields of formal knowledge/ types (all have properties of extent and content)*** • ***subject specific knowledge (formal)*** ***(extent:*** type of info*: theory, structures, principles, assumptions* • ***research knowledge (formal)*** (***extent***: research mindedness – research literacy (***type***: know research process, methodology, knowledge methods & assumptions, • ***Statistical knowledge (formal)*** (***extent***: basic – advanced: awareness, mindedness/ statistical thinking: depend on research role and resources, literacy, advance stats knowledge underlie quality research, & stats areas of importance: design, techniques, stats software, interpretation, correct graphical representation of results, appropriate techniques, ***types of*** **info**: theory, applicable analysis techniques, software packages, interpretation) • ***publishing/ review process knowledge (formal)*** ***(type:*** ***extent:*** ***??Access to knowledge*** • ***Publication savvy***

	• **Experienced knowledge ("Experience")**	**Theoretical code** ▪ ***Experience*** dimension of **knowledge?**	▫ ***Experience submission process*** (Informed: article structure, logical write style, language review, ethical aspects, reference techniques, response style to reviewers in resubmissions, etc) ▫ ***Experience what is publishable for a specific journal*** (Know what editors want: spec aims/ policy of journal & innovative, novelty value, contribute field, advance knowledge.
			• ***Research experience*** (exposure; co-author; research experience; work of snr, colleagues; theory; hands-on approach; train; share knowledge grows, stats training, research training;
			• ***Statistical competence*** exposure; co-author; statistician; theory; hands-on approach; share knowledge grows, stats training,
			• ***Discipline specific experience*** (colleagues, exposure, workshops,
Skills	• **Skills knowledge/ abilities knowledge** Types? ▫ skills ▫ competencies / abilities	**Theoretical code** ▪ **skills/ competencies** dimension of **knowledge category?** ▪ **is competence/ ability different from skills?** **Skills different from 'talent'?** ▪ **SKILLS rather resort under Attributes**	***Types*** ▫ ***skills*** (writing skill; communication skills, social skills, interpersonal skills, problem solving skills, ▫ ***competencies (ability)*** (English proficiency, statistical literacy, IT literacy, research literacy, subject literacy; Competence?? Is this knowledge/ experience/ development? Knowledge, development & experience forms competence ***NB SKILLS rather resort under ATTRIBUTES***
Development	• Training • Exposure/ experience • Availability	**Theoretical code** • *Is development dimension/ subcategory, property of knowledge category? I think so* • ***Development*** *interact with (research)* ***environment***	• ***Training*** (Various training media & areas: ethics, research & methodology, stats & technique assumptions, subject field, publication/ peer-review; quality of training; critical skills: e.g. English proficiency; stats training, research training; discipline-specific training,
			• ***exposure/ hands-on*** (exposure & opportunities; member research team, co-author, conferences, edit/ peer review articles, work of snr colleagues; hands-on approach
			• ***Availability*** (access to knowledge sources; availability of knowledge sources (IT, Library, internet, networks, access to experience opportunities;

Difference	• Countries • Disciplines • culture	Some disciplines/ countries publish more than others **Issue** *** Category? Rather a type of link/ relationship?	Do differences indicate to a relational link?
Role players	• Internal to researcher environment • external to environment	**Issue:** *** Separate category? Most likely – query in o-ended questionnaire	See *research process, research climate; management* categories; (Consider in *research practice* category – the concept of team approach is a research practice – but a "team" is also a "role player"?)

Environment	o ***Global*** o ***Institutional*** o ***Departmental*** o ***Research*** o ***Editing environmnent***	**Theoretical code:** o ***Environment*** a category with sub categories of, o ***Macro*** o ***Institutional*** o ***Departmental*** o ***Research*** o ***Editing environment***	***Macro environment dynamics*** * Links to research practice (see category of research practice) *
	• ***Institutional*** **Environment**	**Theoretical code:** • ***Environment*** **category** interact with ***Research climate & management***	***Institutional Environmental dynamics:*** ▪ ***research climate*** • ***management***
	• ***Departmental/*** **faculty** environment		***Departmental Environment dynamics*** ▪ *Impact* ***research climate****/ dept characteristics* • ***Management*** *impact*
	• ***Research*** **environment**	**Theoretical code:** ▪ ***Research environment*** *interacts with* ***researcher*** ▪ ***attitudes,*** ▪ ***attributes,*** ▪ ***skills& knowledge*** ▪ ***research practice*** ▪ ***research process*** ▪ ***research resources*** ▪ ***management***	**Elements of research environment** ▪ ***Research climate/ discipline differences*** ▪ ***Management*** ▪ ***Researcher attributes*** ▪ ***Researcher skills/ abilities/ competencies*** ▪ ***Researcher attitude*** ▪ ***Knowledge & experience*** ▪ ***Development*** ▪ ***Research practice*** (***Research process*** ▪ ***In research process all teamwork elements are important*** ▪ ***Research resources*** ▪ ***Motivation***
	• ***Editorial environment***	**Theoretical code:** ▪ ***Editorial environment*** *interacts with* ***researcher*** ▪ ***management*** ▪ ***attitudes,*** ▪ ***attributes,*** ▪ ***skills& knowledge*** ▪ ***research practice*** ▪ ***research process*** ▪ ***research resources***	**Elements of editorial environment** ▪ ***Administrative component of editorial environment*** (effective journal & journal-office administration; publishing house) ▪ ***Review process*** (Editor input/ decisions; Liaison with reviewers; effectiveness turnaround time) •***Editorial policy, aims & objectives*** (Stratification: ratio new/experienced authors included; innovative research;) •***Properties of editor/ peer reviewers:*** o***Knowledge & experience*** (Subject experts; statistical knowledge-ability; research knowledge-ability; methodology; research experience; publishing experience; experience reviewing;) o***Qualifications*** (Academic background; field of study; statistical literacy) o***Biographics*** ***Academic age editor,*** o***Bias*** (Affiliation bias: academic institution; network-group; research design; country; theoretical orientation; writing style. Preference/ experience specific research design, methodology)

4.3.7 Explaining relational links as a component of ROP theory development

The summary of theory progression reported in Table 4.29 indicates clearly that categories start to evolve from data events and conceptualisations suggested by the literature database. This

framework also indicates that particular issues regarding categories still require further investigation (please refer to Section 4.4.1 for a list of issues that need clarification in further analysis cycles).

However, apart from identifying and labelling categories, dimensions and properties, theory development is also concerned with relational links between and within categories. Therefore, to advance theory development from another perspective, notice was taken of suggested relationships between categories and their effect on the research process and the delivery of research output. To further understanding of the emerging ROP dynamics, types of relationships that emerged were listed and described and a first attempt was made to integrate the relationships visually in a structure of categories (and constructs that require further clarification) and relational links (Figure 4.5). Types of relationships identified are listed in the next paragraph (also indicated in Table 4.29, in the third column) and the relationships are indicated as directional lines between categories in Figure 4.5 that follows.

Reviewing relational links between categories revealed that not only type but also the extent of influence of relationships varied, for example:

- *Relationships that directly or indirectly affect RO and ROP:*
  Some categories directly impact on the *research process* (which in turn impacts RO) whiles other categories indirectly affect how research is executed and published. For example, a favourable *research climate* directly impacts on the *research process* (indicated by a red solid line that links *research climate* and *research process* in Figure 4.5). Likewise, *attributes or skills*[65] of researchers (e.g. *writing skills* or *English proficiency*) directly impact on the *research process* (indicated by solid directional blue lines connecting *attributes and skills, researcher as role players,* and the *research process).*
  On the other hand, the *attitude* of *management*[66] could have an impact on the availability of *research resources* which, in turn - amongst other consequences - could impact on the *research process* thereby having an indirect effect on output delivery (this indirect relationship is indicated by the broken red line directional arrows in Figure 4.5). The other red solid line directional arrows in Figure 4.5 point to possible other consequences that the availability of *research resources* could have on the *research process* and *research publication* (as suggested by data events from the literature), for example:
  ** *Research resources* imply access to training and *development* (a dimension of the *knowledge* category);
  ** Availability of *research resources* creates favourable *work conditions* and *research climate*[67]*.*
  All of these effects/categories (knowledge, work-conditions) in turn impact on *research climate* and the research process. The *research process* affects the production of *research output*.

- *Categories that relate to several other categories;*

[65] It still had to be clarified – at this stage- whether *skills* forms a dimension of *attributes & skills* rather than a dimension of *knowledge*

[66] It still has to be decided/ clarified (at this stage) whether *management* forms a dimension of the *research role-players category*?

[67] Literature suggests that *work-conditions* form part of the *research climate* of the researcher

The above example of how *management* and/or *research resources* can (indirectly) affect the *research process* and *ROP* in more than one way (e.g. knowledge, work conditions) suggests that some categories interact with more than one other category or with most other categories while other categories only impact on a single category e.g. the *review process*[68]. Figure 4.5 for example illustrates that the *research process* category interacts with all categories, albeit in different ways (the *research process* eventually impacts on the delivery of *research output*). On the other hand the *publishing process* and the *ethical review/or clearance process* (both subcategories of the *process* category) link only to the *research process.*

- *Direct, underlying and core-category types of relationships and the extent of an effect*

A type of relational link is suggested (via the literature data source) between the *research process, production of research output* and the ROP *environment* category, that differs from, for example, that of the relation between the *research process, research production* and *English literacy (*dimension of the *skills and attributes* category). This example serves to emphasise that the reach or extent of impact of the *environment* category on all other ROP categories seems general and underlying. For example, within the *government environment,* perceptions of research importance and allocated budget to research nationally affects all research activity and components of ROP - in contrast to *researcher skills* (via the *English literacy* dimension) that exhibits a more localised effect on the *research process and ROP*. This suggests that reach of impact is another component of relational links.

In addition to extent of impact, the *environment*-type of relationship furthermore seems different from the type of relational links associated with a core-category of developing theory. The business dictionary (www.businessdictionary.com), for example, defines environment and, by implication, the underlying relationships with surroundings, as follows:

> Environment is the sum total of all surroundings of a living organism including natural forces and other living things which provide conditions for development and growth as well as for danger and damage.

In other words, environment represents 'the global and compartmented environments in which we live and breathe'. The relationship of the environment category (with dimensions of *global, institutional, departmental and research* environments) can be defined as a general underlying 'given'. In contrast the distinguishing characteristic of a core category is that the category relates to most or all other categories of relevance to the specific phenomenon investigated (Strauss and Corbin 1990:116). Given that a researcher resides within a specific *institutional environment*[69] this will impact on how research is perceived, supported and conducted at the particular institution (this type of relationship is indicated as a square box in Figure 4.4). Likewise, the research focus of a specific department (the *departmental environment*) is also a given, underlying effect, etc.

- *The research process as emerging ROP core category*

The interconnectedness of the *research process* with most other categories – illustrated in Figure 4.5 – strongly suggests the role of the *research process* as a core category of developing theory.

[68] In initial research cycles, it still had to be clarified whether the *article review process* forms a dimension of the *research process* or whether the *review process* represents a stand-alone category – the same issue had to be clarified with regards to the *ethical review process.*

[69] This is an effect the researcher 'cannot escape' – the type of underlying effect

When viewed from a practical research perspective this finding is logical, presents as a viable option for ROP theory and advances the theory development of this study. The strong suggestion of the *research process* as a core category was further verified in continued cycles of data collection and analysis described in Section 4.4 of this chapter.

- *Interrelated and multifaceted*

  Theory development with respect to relational links (theoretical code) in the initial cycles of GT execution seemed both interrelated and multifaceted. This mirrors the recorded experience of Subotzky and Prinsloo (2011) on a study of the nature of factors that impacts on student throughput:

  > The student journey consists of mostly non-linear, multidimensional, interdependent and often mutually constitutive interactions at different phases in the nexus between student, institution and broader societal factors.

  (This study covers many elements analogous to the ROP study currently under discussion).

Comment

An important deduction derived from the visualisation of relational links (and which guided further theoretical sampling and analyses) was the suggestion in the literature that perceptions of 'doing research' and 'delivering research output as published articles' are vantage-point dependent. Stated differently, how the *research process* (towards the production of research output) is perceived depends on the *environment* and vantage point of the authors of such articles (that form part of the literature data source of this study). Data-events when captured clearly indicate, for example, that an *institutional* perspective on ROP has other interests at heart when it comes to published articles compared to what a researcher perceives as important from within a direct *research environment*. The literature suggests that perceptions of what constitutes influential factors on article publication are influenced by the *environment* of the opinion maker. This realisation directed further theoretical sampling: in continued data collection and analysis cycles (discussed in Section 4.4) participants representing various vantage points or *environments* were theoretically sampled to verify initial theory development that dimensions of the *environment e*cho different opinions of impacting ROP factors. The argument will be proposed in Section 4.4.1 that research can be further delimited by using the environment category and, more specifically, the research environment subcategory as a delimiter.

Figure 4.4: Different types of categories suggest different relational links: indicated by means of different shapes (processes, environments, role players, and other categories)

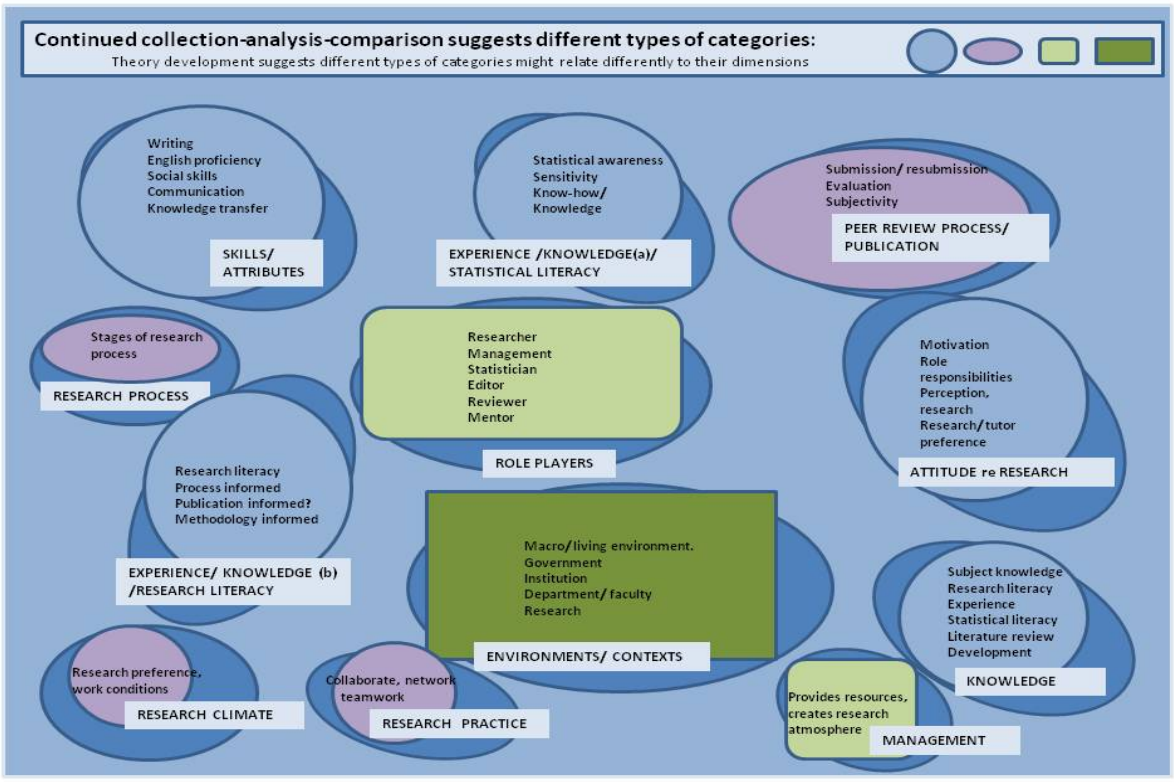
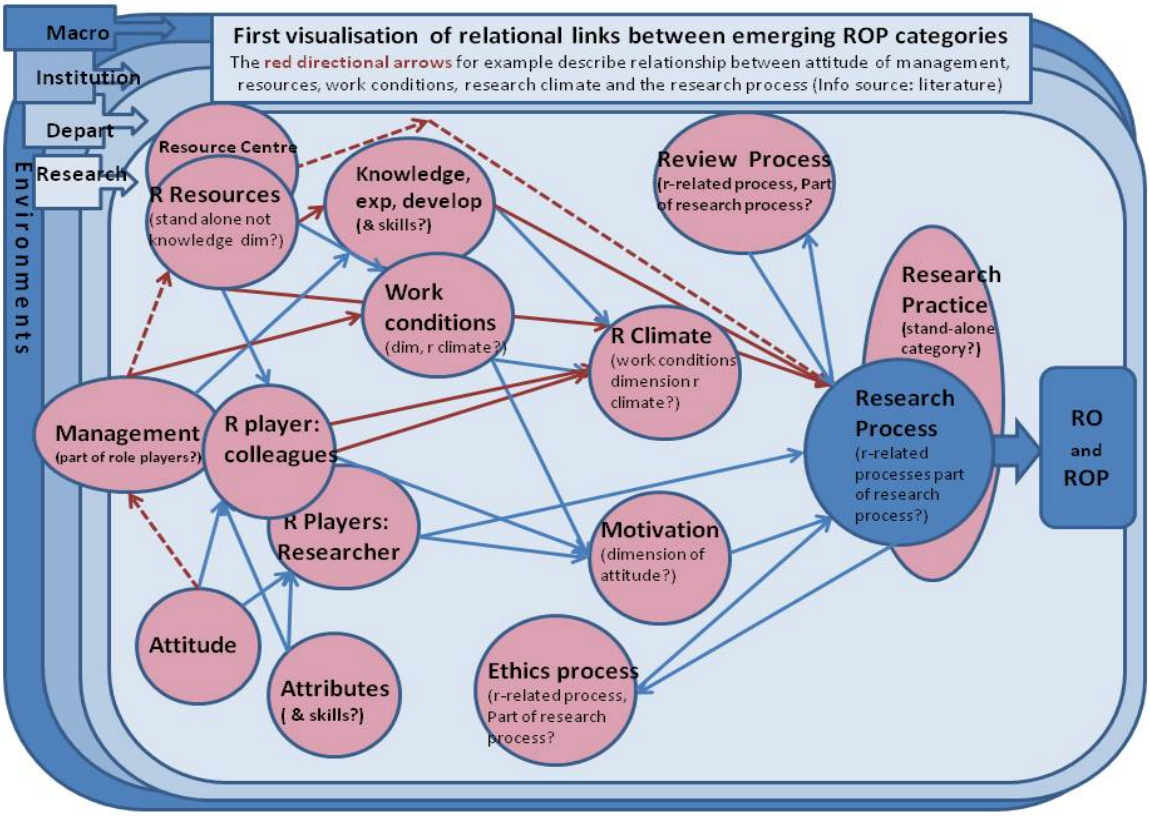


Figure 4.5: A relational diagram to integrate relationships and categories into developing theory of ROP



4.3.8 Reflecting on theory development to guide continued analyses

Although the deductions derived in Section 4.3.6 and 4.3.7 prove that theory developed when the literature was used as data source, some issues still remain unclear and affect how continued analysis cycles will be approached. One such issue concerns the surplus amount of information collected in the commencement cycles (for example, information reflecting the perspective of ROP expressed from within various environments). This brought the realisation that the research field of this study was still too broad. Storberg-Walker (2007: 70) came to the same conclusion in her study on developing a theory of *theory building:* the literature in the field was vast, diverse and overwhelming.

Along with the realisation that the research field had to be narrowed down, several findings in the commencement phase guided continued research in the next cycles of sampling, data capturing and analyses. These included:

- The fact that *environment* started to emerge as a category of ROP
- The fact that provisional findings indicate that the vantage point of opinion-makers influences how the research process is perceived and consequently what affects ROP. For example, a *government* (dimension of *the environment* category) interested in returns on funding, could, from a 'return on investment' perspective, focus on the quantity of research output (published papers); whereas an *institutional p*erspective concerned with the status of an institution as an acknowledged research university could value quality and recognition, and focus on the research rating of their institution as important (via publications in quality international journals and citations ranking etc); the viewpoint of an academic researcher (in a *research/er* environment) might entail detail, integrity and appropriate research techniques when investigating a specific phenomenon. Additionally the research topic might not resort under flagship research areas of the university. Each of these objectives represents a worthy cause but signals a different viewpoint on ROP
- In addition, findings up to this point indicate that more information was required on specific aspects of categories and conceptualisations to clarify and densify categories. The majority of these areas of uncertainty are noted in Table 4.29.

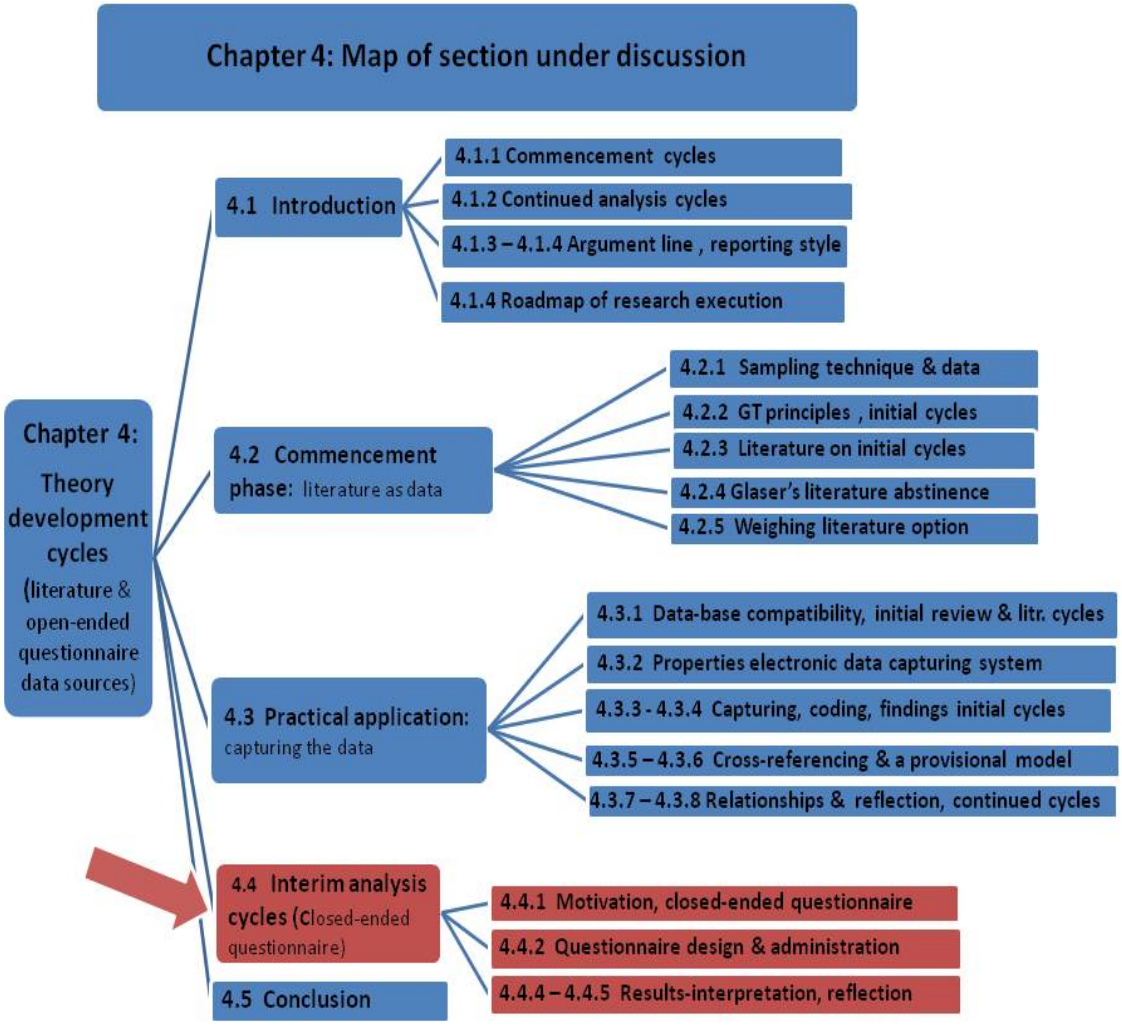
In the In the execution of analysis cycles discussed in Section 4.4 to follow, additional information was theoretically sampled from participant-responses to an open-ended questionnaire (and other sources) in order to clarify listed issues of uncertainty. The argument in further analysis cycles was that since theory started to emerge in the commencement phase of the research (Table 4.29) and themes, categories, areas of uncertainty and preliminary relationships could be defined and noted, advancement of theory development, at this stage, required information to clarify particular issues and inform categories and relationships. Theoretical sampling would be ideally suited to provide relevant information (Storberg-Walker 2007:70).

Findings furthermore suggested that vantage point (re perceptions of ROP) was important since a more detailed evaluation of the perspectives of representatives from the various subcategories of environment (the environment category) seemed an informative way of firstly verifying and densifying the *environment* category, and, thereafter delimiting the study to the *research sector* of the *environment* category. It was reasoned that the researcher environment should be the focus of this study because the empowerment of researchers to increase quality research productivity is the

aim of this study. A vantage point that would therefore reflect the perspective of researchers - in their *research* environment - would best reflect factors that are of essence to the 'producers' of research output. Regarding research delimitation, Storberg-Walker (2007: 71-72) identified various stages of theory development as components in her study on the theory that underlie *theory development.* Of these phases the phase of conceptualisation presented as the critical component and, in order to narrow down her research, she delimited the study to the conceptual phase of *theory building*. In this sense "the conceptual phase" represented a delimiter analogous to the "research environment" subcategory considered as delimiter in this study.

The motivation on how information should be sampled; what information should be sampled; and who should be included as research participants to collect required information is discussed in the next section, Section 4.4.

4.4 Interim analysis execution (the open-ended questionnaire data source)



4.4.1 Motivation for an open-ended questionnaire as a GT data source

The researcher environment as study-field delimiter

Up to this point the analysis of the literature data source identified diverse opinions and viewpoints on events or factors that affect ROP, and how these factors affect research production and article

publication (please refer to Section 2.6.2.2, Chapter 2). Chapter 2 lists aspects ranging from English proficiency (Vasconcelos et al 2009); to grant funding (Jacob and Lefgren 2011); to incentives (Tongai 2013); to human capital investment (Rodgers and Neri 2007); to academic consulting (Perkmann and Walsh 2009) and many more. The overload of information that speaks from these different vantage points made the further delimitation of the study a pressing issue: the different perspectives seemed to suggest an ever increasing list of potential factors that affect the delivery of published articles. A detailed investigation could not sensibly be conducted on such an overwhelming body of information. For example, a single aspect of ROP may involve international, national and institutional components, such as policy on research and research ethics (which represent an entire field of study with associated dynamics that underlie this single aspect); down to grassroots concepts that concern the researcher's subject specific *knowledge, skills*, *attributes*, *research practice* and *research literacy* (each with its own unique dynamics). The question of identifying a suitable delimiter that would segregate diverse opinions on research output into more homogeneous perspective-groups - one of which echoes research output factors that directly involve the researcher and doing research, in other words, a grassroots approach - would simplify the research. Such a breakdown would enable this researcher to single out the dynamics of fewer impacting factors. In this way the problem of productivity could be investigated on a level that directly concerns the researcher: the ability to increase research publication.

Analysis results of the commencement phase suggest that perceptions of research output are vantage point-dependent: be it a global/ *governmental-, institutional-, departmental-, researcher-* or *statisticians'* vantage point. One of the objectives of data collection and analysis in further investigation would be to verify *environment* (and the *researcher environment* as a dimension of the greater *environment* category) as a justified ROP category. In doing so this research would be justified in using the researcher environment as a delimiter of the research field of the study.

Comment
As mentioned in Section 4.1, and also raised by Storberg-Walker (2007: 63, 69) in presenting her GT results, the term 'stage' in the previous paragraph assists in logically describing the ongoing and interactive GT research process and does not imply linear, sequential research execution. Collection and analysis of the open-ended questionnaire database was gradually phased in while analyses on the literature-review database were in a more advanced stage and the need for additional information on a couple of concepts became evident. Harry, Sturges, Kligner (2005:7) affirm that research execution is not a linear process but reporting on the research findings is best done in a linear fashion.

The above trail of thought was taken a step further by arguing that this suggested set of subcategories of an *environment* category could be bounced against the input of representatives, theoretically sampled from the various sub environment categories, to confirm the emerging *environment* category. In the next phase of the research discussed in this section, representatives were theoretically selected from the *institutional-/ departmental* environment (managers); the *editorial environment* (editors and/ or peer reviewers) and the *research environment (*researchers and statisticians) to represent the various voices on research output which seem to emerge from the literature.

Literature of the commencement cycles supports the concept of an *environmental* or vantage point perspective (in this instance of ROP) and verifies that environment is a recognised theoretical construct in many fields of research. For example, the effect of the environment is incorporated in research on the field of engineering (Li 2012: 33); in business (Endele 2002:10); in economics and evolutionary economics (Foster and Potts 2007; Dopfer, Foster and Potts 2004:263, 365) and in ecology, specifically Bronfenbrenner's developmental ecology model (Christensen 2010:101-104; Bronfenbrenner1979)).

Issues that require clarification in continued research execution

In addition to the verification of *environment* as a significant category of ROP theory, additional information was also required at this stage of theory development to inform and clarify issues regarding the *research process* and *research practice; role players, management* and *the research process; skills, attributes* and *abilities; and research resources* and *research resource centres.*

More information was specifically required to decide on the following:

- Whether 'vantage point' and the dimensions of the ROP-*environment* category imply the same concept,
- Whether 'doing research' should be explained in terms *of a separa*te category, the *research process* category (a type of generic step-by-step framework), and whether a separate category, *the research practice* category is justified. The last-mentioned category represents research characteristic*s or practices th*at a researcher brings to the generic research process. In other words it was necessary to decide on whether one or two categories would best describe the steps of doing research and the personal slant that each researcher brings to the table when doing research,
- Whether r*ole-players* form a dimension or proper*ty of the research process* c*ategory or whethe*r *role-players* should be regarded as a standalone category, with research team member*s, managers, colleagues*, and other interest groups constituting dimensions or sub-dimensions of the *research role players ca*tegory,
- Or *whether management* should rather be r*egarded as a standalone ca*tegory *because of i*ts *presence in t*he *global, institutional, departmental* and even *research* environments,
- *Whether research resources* and *research resource centres should* be *regarded as a s*in*gle category of research resources,*
- *Whether theory formulation should distinguish between skills, properties, abilities and attributes, or whether these concepts jointly describe a skills, or, skills and attributes category. In the same context the question of* whe*ther attributes and properties of researchers justify a separate categor*y (e.g. a *biographical* category) or could also re*sort under a single attributes and skills* category,

In addition to these specifica*lly mentioned* aspects that required clarification, the issu*es listed in Table 4.2*9 also required attention in continued analyses.

Motivating the design of the questionnaire to address the mentioned issues

Against the background of the issues to be clarified, research reasoned that information from participants in different research-related sub-environments (to verify that vantage point or position impact on perceptions of ROP) could readily be collected by means of open-ended questionnaires. The use of an open-ended questionnaire was motivated by several considerations. Self-administered

questionnaires can accommodate busy schedules and physical distance and are cost and time effective in the sense that participants can interrupt questionnaire completion and jot down responses as and when ideas come to mind. Furthermore, literature reports that independent studies found open-ended questionnaires a suitable data collection tool in their research. The experiences of these researchers are briefly described in the next paragraph.

In a grounded theory study on ethics, Bennett (2008) discusses how an open-ended questionnaire was successfully used to collect and analyse information related to four aspects of ethics. These included how role players understand ethics; how people deal with ethical dilemmas; types of ethical dilemmas; and how such dilemmas are resolved. Although Bennett's research topic differs completely from the topic of the current study, the research needs and setting of Bennett's research (at that particular stage) show remarkable correspondence to the circumstances of the study currently under discussion: perceptions on ethics in educational psychology are dependent on the vantage point of role players. The role players in Bennett's research belong to a complex social setting underpinned by multiple power relationships. This agrees with the *vantage point* or *environment scenario* of the current ROP study. Bennett successfully argued that collecting information by means of an open-ended questionnaire enabled her to:

- Sample from the various 'ethics-environments'. These environments constituted the various fields of study in education (This is analogous to the institutional-, departmental-, editorial and research environment of the current study),
- Allow participants to ponder issues as opposed to an 'on the spot' response associated with interview situations (which also suits the type of questions to be answered in the current study);
- Ensure, by means of written responses to the questionnaire, that researcher-bias is not introduced into the study in the sense that, had interviews been conducted, the researcher's own ethical orientation could influence interpretation of interview feedback (applicable to the current study);
- Ensure, by means of a written response that bias was not induced by respondents themselves (had interviews been conducted) in the sense that participants might be inclined to adjust their responses to what they perceive the interviewer's ethical stance might be (similar to conditions in the present study). In this regard, Losch (2006: 137) refers to the lack of anonymity in an interview session which is accommodated (at least to some extent) when questionnaires are administered: respondents are freer to express themselves on paper than in face-to-face settings with an interviewer;
- More effectively collect information on specific aspects of the research (in other words more effectively clarifying specific issues) by means of properly formulated questions (in a questionnaire) than would have been the case had interview been conducted.

These aspects were very relevant to the research under discussion in deciding on an open-ended questionnaire to collect information. Harry, Sturges, Kligner (2005: 4) promote the practice of using several data sources to inform and saturate categories (mentioning open-ended questionnaires as an option in GT research). The fact that the researcher of this study comes from a quantitative background was also a consideration since the researcher felt more at ease administering and analysing questionnaire responses than conducting interviews and capturing the crux of discussions without introducing researcher bias.

The literature of the commencement analysis cycles indicates that apart from Bennett's approach, other researchers also collected information in GT studies using open-ended questionnaires. For example, Currie (2009:26) used a short survey to identify potential participants in continued GT research cycles; Hale and Moss (1999) used an open-ended questionnaire to clarify four constructs related to a study on internet searches; Graham and Thomas (2008: 119) used a sample survey (open-ended) to explore strategic and technological perspectives on Knowledge Management in the construction industry; and Losch (2006: 133,135-137) used an open-ended questionnaire in an e-Reverse-Auctioning study, which stretched over different environments (private and public sector buyers and suppliers), to develop an e-Reverse Auction model.

To conclude the motivation of an open-ended questionnaire as data collection instrument, the question was asked whether the methodology (when an open-ended-questionnaire is administered) still adhered to GT principles: The fact that information on specific areas was required to advance theory development correlates with the GT principle of theoretically sampling specific data sources (Storberg-Walker 2007:70) to clarify concepts, categories and relationships which was the purpose of data collection and analysis at this stage. Having motivated the use of an open-ended questionnaire, the next section describes the design of this questionnaire to advance theory development.

4.4.2 Questionnaire design and administration

Questionnaire design

Losch (2006:136), in her study on the perceptions of buyers and seller in the e-Reverse auctioning field, stresses the importance of environment on perceptions. This corresponds with this study's approach to motivate the questionnaire-design as a means of capturing information on specific aspects of ROP (that require clarification) from different perspectives or environments. The different environments are represented by individuals that serve in various capacities with an interest in research, for example, departmental managers in the departmental environment; reviewers and editors in the editorial environment; and researchers and statisticians in the researcher environment.

As indicated in Section 4.4.1, the main issues of concern included verification of a ROP *environment* category; the *research process* (and *research practice*) category/ies; *role-players* as a standalone category; the *research resources* (and *research centre*) category/ies; as well as the *attributes and/ or skills* category/ies. The questions compiled to probe these aspects are discussed in the following four sections:

(i) *Environment and vantage point perspective*

The questions compiled in this regard aimed to illustrate that perceptions of the *research process* and *publication of research* findings are vantage-point dependent. In other words, the capacity in which research participants serve in relation to research affects how the *research process* and *publication of research* findings are perceived. By following this approach it was anticipated that *environment* differences would be observed in participant responses (indicating *environment* impact) and furthermore that information sourced in this way would clarify and densify previously identified categories. The questions q4, q5, q13-q16 of the questionnaire were worded in four separate versions of the questionnaire to apply to departmental managers, academic researchers,

editors and reviewers of accredited journals and practising statisticians. The questions below apply to academic researchers in the *researcher environment*. The alternative wording of questionnaire to participants that represent the *departmental, editorial* and statistical-*researcher environments* are indicated in brackets:

Questions in the open-ended questionnaire that investigate the viability of a ROP *environment* category and collects information on the *research process* and *research output productivity*	
Question	**Open-ended question**
4	Do you believe that a person's perception of 'what affects research publication/ article publication' is influenced by his/her vantage point? (e.g. being a researcher, statisticians, faculty managers, journal editor, etc.)
5	Why are you, as a researcher (or manager, or publisher, or reviewer, or statistician) concerned about research output productivity
13-16	In your capacity as a researcher (or a research manager, or editor, or reviewer, or statistician) which issues and actions in the ▪ Institutional environment ▪ Departmental environment ▪ Research environment ▪ Editorial environment, have the potential to impact the research process & publication of research findings

(ii) The effect of environment, the research process category and the research practice concept or category

Questions on these issues were again formulated to illustrate vantage point/environment-dependent responses and to clarify the concepts of *research practice* and r*esearch process* activities. Initial analysis cycles suggested that *the research process* defined the procedural steps of research while *research practice* referred to the personal way individual researchers conduct their studies (e.g. means of research collaboration, solo- or team work approaches and more). Questions in this regard asked of participants:

Questions in the open-ended questionnaire that investigate the *research process and research practice* category/ies	
Question	**Open-ended question**
10	Please jot down – in bulleted format – the research steps that you as a researcher (research manager, editor, reviewer, statistician) perceive to be vital steps in producing a research article: from inception of a research idea to article submission
11	Which steps of the research process do you as a researcher (or managers, or reviewer, or editor, or statistician) perceive to be the most critical step/s towards successful article publication?
12	Which obstacles in the research process do you as a researcher (or a research manager, or a reviewer, or an editor, or a statistician), see as potentially the most critical for article production and acceptance in accredited journals?

The rationale for the inclusion of question 11 was to evaluate whether the perception exists that researchers conduct their research in unique ways – which would unique research practices.

(iii) The category/ies of *research resources and research resource centres*

The questions on this aspect inquired about the resources required to do research and publish successfully. Perceptions of participants would again serve to verify environmental impact and position the role of research resource centres (as standalone category or dimension of the *research*

resources category). Questions included:

Questions in the open-ended questionnaire that *research resources* and *research resource centre* category/ies	
Question	**Open-ended question**
8	In your capacity as researcher (or manager, or reviewer, or editor, or statistician), please indicate the type (select from a list) and extent (rating list choice) of statistical services deemed necessary to deliver a quality article
9	Do you, as a researcher (or manager, or editor, or reviewer, or statistician) believe that a research resource centre at an academic institution (that supplies certain research support services) will impact research publication?

(iv) R*esearch role players as standalone category or dimension of the research process*

The qualities of role players and the relationship between role players were investigated to assess role player influence on research and research publication. The reasoning in this regard was that *role players* could be regarded as an integral component (dimension or property) of the *research process* (category). However, it was also argued that such an approach could hinder initial theory development (refer to Figure 4.5) and did not seem to accommodate the contribution of *role players* to theory formulation adequately. The feasibility of a stand-alone role player category (with type of role player as subcategories) was thus further considered in the following questions:

Questions in the open-ended questionnaire that inform the concept of *role players*	
Question	**Open-ended question**
19	The literature refers to a number of role players that have the potential to impact the research process & successful publication of research. Who do you as researcher (manager, reviewer, editor, or statistician) perceive to be influential role players? Please list. What role do they play in research?
20	In your experience as a researcher (or a manager, or a reviewer, or an editor, or a statistician) to what extent do you believe that successful research & research publication are influenced by the researcher and a research team (& other role players), or, solely by the researcher? (Rating scale options included). Please motivate briefly
18	Recall from memory a researcher that you as researcher (or manager, or editor, or reviewer, or statistician) perceive to be proficient in conducting and publishing research. Please list the success competencies/characteristics that you can think of that empower him/ her to publish successfully

(v) *The article review process. Standalone category or dimension of the research process*

The purpose of the following questions was to inform the researcher on the role of the article *review process* and decide whether the *editorial/article review process* forms part of the *research process* or whether it forms a standalone category. Questions on this aspect ask:

Questions in the open-ended questionnaire that inform the concept of *role players*	
Question	**Open-ended question**
22	What are, according to your view as researcher (or editor, or manager, or reviewer, or statistician), the characteristics of an efficient editor?
23	In your experience as a researcher (or manager, or statistician, or reviewer, or editor) what characteristics/ competencies qualify peer reviewers to make a just evaluation of a submitted article?
24	Apart from article content, novelty of research and neatly structured layout, to what extent & how do other factors have the potential to impact editors' and/ or peer-reviewers evaluation of an article?
25	Considering article content, what do you perceive to be critical issues which cause editors/ reviewers to reject articles or recommend 'a serious re-write' prior to resubmission?

The open-ended questionnaire for researcher, editors and reviewers, managers and statisticians is included in Appendix 4.3. The questionnaire was designed as a self-administered questionnaire and participants could complete the questionnaire in their own time, interrupt completion, ponder responses and submit (electronically) as they found convenient. Research planning allowed a two-week period for questionnaire completion. The questionnaire was submitted to and cleared by the ethics committee of the College of Education of UNISA. The ethical clearance certificate of CEDU Ethical Committee was presented when this thesis was handed in for examination.

Questionnaire administration

Since information (via the open-ended questionnaire) would be theoretically sampled from the environments of interest to this research, potential research participants were identified in the institutional and departmental environment (as represented by the management corps); the editorial environment (represented by journal editors and peer reviewers); and the research environment (as represented by researchers and practising statisticians). Over a period of three months (January to March of 2014) the researcher approached these participants to enquire about their willingness to participate. These participants were mostly identified within the UNISA community but on two occasions from outside UNISA (practising statisticians). Three managers; two editors (a UNISA journal and an international journal); three practising statisticians (a UNISA appointment, an external statistician from another HEI and a statistician at a research institution); one researcher[70] (UNISA) and two reviewers (UNISA journals) indicated their willingness to partake. Statisticians external to UNISA were included because sufficient numbers could not be sourced within UNISA (for example, UNISA had only two practising research statisticians at that time).

The researcher personally distributed and collected the questionnaires (May 2014 to September 2014). Two managers and two peer-reviewers did not return their questionnaires. One statistician returned an incomplete questionnaire. The questionnaires were analysed as soon as a questionnaire was returned and the information captured to a database. The analysis cycles of the open-ended questionnaire responses proved to be very informative and an initial idea to source more data by distributing additional open-ended questionnaires was not executed since the collected and analysed information proved adequate in clarifying listed uncertainties (Section 4.3.1). The results of the analysis cycles are elaborated in Section 4.4.3. The approach of this study, namely theoretically sampling from more than one data source, thus proved to be appropriate in developing theory (as will be indicated in the next section) and agrees with the statement by Harry, Sturges and Klinger (2005:4) that sampling from multiple data sources more effectively achieves saturation and triangulation of data and theory.

The confidentiality of research participants was protected in the sense that the respondents' names were not entered on the questionnaire, and data-events were entered in the database against an encoded serial number. The respondents' names were never entered into any database and the

[70] For the open-ended questionnaire research argued that research participants should be sampled over a broad spectrum of the substantive area to illustrate that environment (opinions of participants) impact on perceptions re ROP. Therefore only a limited number of academic researchers were included in the open-ended questionnaire cycle. (Chapter 5 will indicate that the research field was delimited in advanced analysis cycles and 31 academic researchers that represent the delimited field - were theoretically sampled in this instance).

original questionnaires are stored in a safe which only the researcher and her supervisor have access to. The original questionnaires will be destroyed once the study has been completed.

The results of the analyses of the open-ended questionnaire are reported in Tables 4.30 to 4.32 and the deductions and analyses are discussed in Section 4.3.3.

4.4.3 Results and interpretation of the open-ended questionnaire/ data source

This section reports on the results derived from the analysis cycles of the open-ended questionnaire and compares results to the theory-development issues raised in Section 4.4.1. The findings are summarised in Table 4.30 to 4.32 and report on (i) the viability of an *environment* category as component of ROP theory; (ii) clarity on a *research process* and a *research practice* category, (iii) a *research resources* category; and (iv) on the *role-players* category as a standalone category of ROP theory.

Results and deductions

(i) *The impact of environment: an environment category* (Table 4.30)

The discussion in Section 4.4.1 observed that more information on the emerging *environment category of ROP* was required to clarify whether theory development was justified in firstly assuming that the capacity in which research participants serve (e.g. managerial, editorial, researcher and statistical support capacity that all have an responsibility/interest in research) represents different environments, and, secondly, that this vantage-point (capacity participants serve in) influences how participants understand and perceive the phenomenon of research output productivity. By clarifying these two issues, theory development is justified in assuming that a ROP *environment* category exists, plays an important role in modelling ROP, and can serve as a delimiter of the research field of the study. (If theory on ROP is to be developed from the perspective of the statistical support community involved in the research process, perspectives from the researcher environment should be sourced to refine and develop theory).

As an introduction to this discussion three narratives of participants reported in the questionnaires are quoted in the next paragraph. These narratives[71] reflect responses to q5, that asks 'Why are you as a researcher/or manager/or practising statistician/or journal editor/or peer reviewer concerned with research output productivity (the number of articles published)?' The narratives illustrate how vantage-point (or capacity the participant serves in) affects perception[72]. This verifies environment as a ROP category. Furthermore and that if more detailed information was to be collected to inform ROP theory - from the angle of the researcher and support-statistician in the *research process* - information should be collected from sources close to the *research process*, the researcher and supporting statistician and role players in the direct research environment. In other words, sources in the researcher environment should inform theory and the researcher environment should serve as a delimiter of the substantive field of research.

[71] The view is expressed by participants that serve in the institution in different capacities (editor; researcher; support statistician from an outside organisation). The three respondents are referred to as respondents A, B, C – randomly labelled – to protect their anonymity

[72] These perceptions ultimately point to factors perceived to affect ROP – the topic of this study – and different sectors of the environment focus on different factors they perceived – from their position/ perspective - affects ROP

The above-mentioned narratives state,

> Respondent A (editorial environment):
> "[my concern is] to stay abreast of cutting edge research, and setting the tone and leadership in a field: ensuring the journal publishes frequently to sustain GIF (global impact factor) ratings".
> Respondent B (academic researcher)
> "Research output is the currency that counts in the Higher Education game: your career advancement, reputation and rating is directly measured against your research output"
> Respondent C (practising statistician)
> "Although my involvement in the research process can be considered as indirect, it is my duty to perform statistical analyses as appropriately as possible so that the researcher can build on this foundation [to publish reliable research and advance development]"

The significance of an *environment* category that underlies ROP is further elaborated on in Table 4.30. The table summarises analyses of responses to the question whether vantage point (research capacity of the participants) influences how research interest groups view impacting factors of ROP. ["Does vantage point affect how factors that affect RO are perceived?"] To this question respondents - who were theoretically sampled from different environment sub categories - all agreed (to some extent) that the capacity in which a person serves affects what factors they regard as influential to ROP. The first deduction reported in Table 4.30 therefore suggests that an environment category underlies the theory of ROP.

This initial *environment* vantage point suggestion is further verified by the diverse responses offered when research participants motivate their interest in RO in response to q5, namely 'Why are you concerned about ROP?'. Responses indicate that published articles are, for example, motivated as a bargaining chip for promotion and recognition; a means of ensuring journal prestige and journal rating acknowledgement (GIF); an earner of revenue for the institution; and also true concern about research quality and advancement. This signifies totally diverse perspectives of concern – that can be traced back to the position the person serves in (e.g. a journal editor's concern with articles accepted and published will focus on journal impact and the type of articles that will enhance journal impact) – and, which do not necessarily reflect an intimate understanding of practically 'doing research'.

Verification that the *environment category* can serve as a research delimiter in further research is furthermore supported by the events and issues listed in Table 4.30 by participants to the question of factors in the institutional, departmental, research and editorial environments that affect research output (see questionnaire questions 13-16: 'Which issues and action in the institutional/ departmental, research, editorial environments have the potential to affect ROP?'. Although general issues are raised by participants, events and issues seem environment-specific: editors and reviewers tend to focus on factors that concern the process of article submission and review and the competencies of reviewers and editors; researchers and statisticians focus on time-constraints, resources, ignorance and skills, and a shortage of expertise and services; managers view financial implications and recognition of their institution in terms of research excellence, as impacting factors.

The issue of the *environment* as ROP category can thus be concluded by stating that the different views expressed by managers, editors, researchers and statisticians are vantage-point dependent: environment forms an important ROP category. Furthermore, that research interest (the various environments) does not imply a deep understanding or insight into 'doing research'/*the research process,* and producing articles; and, in order to identify factors that affect research at grassroots level, research should be delimited to the environment (and perspectives) of role players in the researcher's environment, which then constitutes the research delimiter.

Table 4.30: Vantage point or environment effect: Participant responses to questions 4, 5, 13-16 which illustrates vantage point impact on perceptions

Question: 4	***Do you believe that a person's perception of 'what affects research publication/ article publication' is influenced by his/her vantage point? (e.g. being a researcher, statisticians, department manager, journal editor*)**			
	Researcher	**Statistician**	**Editor**	**Manager**
Comment/ narratives	To some extent	Absolutely/ some extent	Some extent	Absolutely
Conclusion: First indication that viewpoint/ environment influences ROP perceptions				
Question: 5	***Why are you, as a researcher (or statistician, or editor, or manager), concerned about research output productivity?***			
Response	* Concern: The 'currency'/ or bargaining value of RO, for - Promotion - Remuneration - Recognition - NRF rating - Institutional recognition	* Concerned quality/ integrity of RO to ensure genuine develop-ment/ growth in research * Concern: quality vs. quantity of RO: quality advances growth * Concern: limited nr of experts to ensure quality (statisticians are scare) * Concern: which research to support statistically: 'worthy' studies ('that matter') * Concern: Providing quality statistical input that will serve as basis/ cornerstone to advance knowledge expansion: reliable, valid findings	* Concerned to uplift/ maintain standing of journal *Concern: articles that enable journal to stay abreast with cutting edge research topics * Concern: articles required that reflect tone & research leadership of journal *Concern: enough good article submissions for journal to maintain / improve global impact factor status (GIF)	* Balance between quality & quantity *Predatory journals are worrying * Inexperienced researchers are compromised by such journals (not recognized research output)
Conclusion: Vantage point (environment) influence perceptions re ROP: RO can be viewed as a bargaining chip (researcher/ research environment); a quality product to promote development (statistician); a means to achieve academic-journal standing or promotion; or as a source of institutional income/ survival Thus: environment (as represented by the vantage point of the research participant) affects how ROP and impacting factors are perceived and interpreted				

Question: 13-16	*In your capacity as a researcher (or statistician, or manager, or editor) which issues and actions in the institutional-; departmental-; research- & editorial environments have the potential to impact the research process & publication*			
	Researcher	**Statistician**	**Editor**	**Manager**
Response	* Departmental: - manage / heavy teaching loads - manage teach/ research ratio - manage / poor research admin - initial ignorance re career importance of publishing * Research: - Unaware/ ignorant to value of stats expertise to the success of a research project ('not versed in stats') - Essential role that publication savvy plays in successfully publishing research	* Institutional: - Awareness/ acknowledge that statisticians/ research resources improve RO - Awareness/ acknowledge that teach/ research workload affect RO *departmental: - Appointment of statisticians - Provision of research resources - Regulate workload statisticians & researchers - Effective statistical & research training of supervisors and then students - Provide research mentors - Regulate student/ lecturer ratio * Research: - Clear understanding, process, design phase * Editorial: - writing skills - time restraint	*Institutional & departmental: - Lack of/ facilitate funding, training, research resources, research services; flexible work hours to increase RO * Research: - Inexperience hampers productivity * Editorial: - Journal accreditation & credibility - An effective submission & review process - competent, experienced reviewers ensure effective review process - Good guidelines for reviewers increase effectiveness	* Sufficient research funding has a positive effect * Funding conditions are sometimes restrictive to research fields/ or researchers * Research climate: Dept. research focus * Mentorship impacts research output * R Collaboration * delays in review process
Conclusion: Responses indicate that ROP perceptions are environment-dependent: an editorial perspective focuses on journal quality - the 'process of submission and review' and competent reviewers; whereas the statistician and researcher focus on time-constraints, resources, ignorance and skills, shortage of expertise and services: the tools required to do research & the research process: grassroots research requirements. Thus: ** The different perspectives of managers, researchers & statisticians; and editors indicate that these perceptions are vantage point or environment-dependent. ** Because researcher environment role players mirror grassroots perceptions of research, the researcher sub environment of the environment category presents as a sensible delimiter in this study.				

(ii) *The research process and research practice categories: 'doing research'*

Table 4.31 lists the questions and summarises responses that inform the issue of whether the process of 'doing research' is a combination of a more generic, procedural *research process* and a component that describes how individual researchers practise research: *research practice* (Section 4.3.1) or whether the two components should be regarded as standalone categories.

With respect to the suggested procedural component, coded responses to question 10 (Table 4.31), 'Indicate the research steps that you perceive to be vital in producing a research article: from inception of an idea to article submission', indicate that participants, though serving in different capacities (environments), focused on procedural steps to describe a *research process* when planning and conducting research. Although participants label the procedural steps in different ways, they separate these steps from specific researcher attributes that individuals bring to their research endeavours. For example, 'doing research', the *research process,* is explained as:

- Informed topic discourse; data collection; data analysis and write-up as a framework describing the *research process* (Researchers).
- Detail activities in the *research process* that concern identification of the research field; literature study; conceptualisation; research question and hypotheses formulation; research design and

design of a measuring instrument; research execution and data collection; exploratory and advanced analyses; results interpretation and report back; selection of an appropriate journal; write-up and article submission (Research support statisticians).
- A framework of activities (Editor and reviewers).

These responses verify the notion that the *research process* is regarded as a procedural process of activities which characterise all research endeavours and which is distinct from attributes and activities unique to researchers and research situations. These results suggest that the specifics of how each researcher practises and organises his/her research forms a separate entity of research and can be labelled a *research practice* category. Practice, for example, is expressed in terms of how researchers communicate and operate; whether they prefer to work solo or in research teams; work in interdisciplinary modes; include international co-researchers; support mentor programmes, network, and more. Examples abound in the literature (Ynalvez and Shrum 2011; Abramo, D'Angelo and Costa 2009); Carillo, Paganini and Sapio 2011)

The analysis of responses to the question of *critical steps* in the research process, question 11 of the questionnaire (Table 4.31), again illustrates the step-wise or procedural nature attributed to the *research process* and that perceptions on this question are *environment*-dependent, with editors focusing on the integrated whole of an article; researchers on the conceptualisation and write-up phase of the article; and the statistical-support perspective on defined objectives, research design, appropriate techniques and interpretation of analysis results. All events describe elements of the framework of the research process.

Apart from informing the *research process*, the responses to question 12 of the open-ended questionnaire, namely stumbling blocks that hinder the delivery of research output (Table 4.31), also served to verify several of the categories that emerged in the initial analysis of the literature-review data source (Table 4.29). For example, responses refer to *teaching loads, mentoring responsibilities, research time* – which jointly describe the emerging *conditions of service* subcategory or dimension of the *research climate* category. This subcategory is indicated in the initial theory development table based on the literature-review analysis in Table 4.29. Furthermore, Table 4.31 reports on other codes, e.g. *aims, objectives* and *research questions*; *research design; insufficient sample size; inappropriate methodology; not knowing the data;* and *write-up* which speaks to the *research process* category; and *poor communication between role players* that speaks to the *research practice* and *role players* categories; i*nability to think logically* and *interpret results; and writing skills* which relates to the emerging *skills and competency* category; and *being informed on subject matter; inappropriate methodology; presentation of research results* that suggest the *knowledge* category, with subcategories of *subject specific* knowledge, *statistical literacy*, and *research literacy.*

By identifying the categories or subcategories that describe events in participant responses to ROP obstacles, several relationships between the *research process* and other categories were identified, or suggested or verified: for example, responses indicated that work conditions often present as a stumbling block when doing research. This implies a dependency between *research climate* (*work conditions* being a subcategory of *research climate*) and the *research process*. This link is, for example, illustrated in Figure 4.5 by a directional arrow from the *research climate* category to the

research process category. Various links with the *research process* category are verified in this manner: the *research process* links to the *research practice* category; to the *skills and attributes/ or capabilities* category; to the *research climate* category (with subcategory *conditions of service)* and to the *knowledge and experience* category.

Table 4.31: A summary table of the analysis of responses to the open-ended questions, q10-12, of the open-ended questionnaire on the issue of *research practice* and *research process* that describe 'doing research'

Question: 10	***Please list the research steps which you (as a researcher; statistician; editor or reviewer; manager) perceive to be vital in producing a research article (the research process)***			
	Researcher	**Statistician**	**Editor**	**Manager**
Comment/ narratives	* Conceptualisation &being informed on topic discourse * Data collection * Data analysis * Write-up	* Identify research field & lit study (Conceptualize research field & topic) * Formulate research questions, hypotheses, objectives (2) * Research-, instrument, analysis design * Execute & collect data * Analysis: Verification instrument-integrity/ exploratory & advanced analyses * Interpret & summarize * Journal decision & submission	* Planning research & topic identification * Research question/ hypotheses formulation * Research design & methodology * Research execution & analysis * Data interpretation & discussion *Conclusion & recommendations	* Decide on journal * Plan structure & reading * Specifics of methodology * Write and edit * Submit
Conclusion	The code suggests a procedural framework or process for the *research process*. Environment influence indicates participants focus on different steps of the process. Both r*esearch practice* and *research process* explain 'doing research' as standalone categories			
Question: 11	***Which steps in the research process do you (in your capacity as researcher/ statistician, editor, manager) see as critical towards successfully publishing an article?***			
	Researcher	**Statistician**	**Editor**	**Manager**
Comment/ narratives	* Conceptualisation * Presentation of research (write-up): element of novelty & in line with current debates	* Defining objectives & research questions * Research design * Appropriate analyses * Results interpretation	* Alignment of research question, design, objectives and method. The submitted article should reflect that rigorous research was done	* Identification of the appropriate/ correct journal very early on in the process
Conclusion	More detail on differences in perspective re the framework of the research process: researcher and statisticians focus on the detail of the process (grassroots issues) while other focus on the integrated whole The influence of vantage point is again illustrated in conjunction to theory development.			

Question: 12	***Which obstacles in the research process do you (in your capacity as researcher/ statistician, editor, manager) experience as stumbling blocks towards successful article publication?***			
	Researcher	**Statistician**	**Editor**	**Manager**
Comment/ narratives	* Work conditions: teaching loads * Work conditions: mentoring responsibilities time consuming *Time for research (Categories: *research climate; management(role-players category?); knowledge*)	* No clarity on : Aims/ objectives/ research questions; research design (category: *research process*) * Insufficient sample size (category: *knowledge)* * Poor communication between role players (category*: research practice, role players)* * Not 'knowing the data'/ engage (category: *research practice/ process; knowledge)* * Inability to think logically & interpret results *Writing skills (Category: *skills)* * Time constraints (Category: *management, research climate*	* Being informed: The submitted article should indicate that the researcher is informed on his/ her topic, research questions, design & objectives: these can present as critical obstacles. * Inappropriate methodology * Write-up: meticulous selection of & presentation of findings (Categories: *knowledge; research process; skills; research & statistical skills/experience; writing skills: attribute/ skills category?)*	* Time constraints/ research climate * Inadequate research skills * Slow/ delays in review process (category of *research process, research climate; skills and attributes; review process* – (part of *research process* category?))
Conclusion	Identify/ verify different categories of ROP theory, not only *research process* and research practice. Links and relationships between categories (especially the research process category) are identified/ verified.			

(iii) The *research resources* category: the issue of *resources* and *resource centres*

The issue of theory development raised in Section 4.3.1 also queried whether *research resource centres* describe a dimension of the *research resources* category or whether *research resource centres* forms a standalone category of ROP theory. Although the statistical component of *research resource*s and *research resource centres* is questioned in particular by the open-ended questionnaire – as set out in Table 4.32 - this study assumes that resources such as training, IT software, internet access and communication, funding, means to collaborate with national and international researchers, research administration, translation and editing services also form part of research resources. These mentioned resources are also listed in the literature sourced and analysed in the commencement cycles of analysis and are therefore implied in theory development discussions that follow in this section and in theory-discussions of Chapters 5 and 6. However, the questions on *resources* in the open-ended questionnaire specifically focus on *statistical services, support* and *resource centres* because the literature (and personal experience) indicate that *statistical resources* are very relevant to ROP, but limited. More information on statistical support in the *research process* will enrich theory development in this study that focuses on ROP as observed from a statistical-support perspective[73].

Table 4.32 reports on the analysis findings derived from responses to questions 8 and 9 of the questionnaire regarding the type of statistical services of value to researchers and their perceptions of the value of *research resource centres*. The crux of the findings is summarised in the following

[73] Chapter 1 motivated this study by indicating the researcher of this study's own experience as a practicing support-statistician observing effective and less effective research practices in statistical support consultation with researchers. The researcher kept memos of these trends in the analyses-reference files of these researchers.

narrative which a researcher offered on completion of the open-ended questionnaire (Researcher D):

> We have a *research resource centre* at Institution X (in South Africa) where I registered for my doctoral studies. Without these services I would not have been able to complete my studies. Institution Y also has a fully functional research resource centre. Such centres are a prerequisite for successful quantitative research. For example, at the research centre a statistician is assigned to each study and advises doctoral students and supervisor/or researchers on best practice in quantitative/mixed methods research: in this respect the statistician has full autonomy.

This message, also echoed by other respondents, is clear: quality and productive research require resources and support services which include statistical support. The extent of support depends on the type of research (quantitative, qualitative and mixed methods) and the researcher's statistical and IT literacy and research experience. Table 4.32 verifies that research *role players* at grass roots level (the researcher, co-researchers and statisticians) regard *statistical support and services* essential (mean rating values greater than 4 serve as a rough indicator of this statement); while *role players* further removed from the actual process of doing research (managers and reviewers) view *statistical services and resources* as not always an essential service. (The effect of *environment* again presents itself in this finding).

The analysis of the responses also assists in clarifying the concepts of *research resources* and research *resource centres*: both concepts serve the purpose of 'support to promote the *research process*' and therefore jointly describe the category labelled *research resources.*

The analysis of the resources-question responses (q8, q9 and q21) furthermore suggests and confirms relationships implied in the literature analysis cycles reported in Table 4.29. A few of these relationships (thus theoretical code) are listed below:

- The list of statistical services investigated in Table 4.32, e.g. consultation services, questionnaire design, feedback on analyses, report writing, all imply *knowledge* transfer: therefore a link between the *role players'* category, *knowledge* category and the *research process* category (please refer to Figure 4.5 for a tentative visual model).
- A dependency between *role players* – as represented by *management* (subcategory/dimension of the *role players* category) – and *research resource* centres (a subcategory of the *research resources* category) is implied by the fact that *management* on a departmental or institutional level has the executive power to make provision for *research resource centres* (Figure 4.5 illustrates the relationship)
- The availability of *research resources* impacts on the *work conditions* (subcategory of the *research climate* category) of researchers. This demonstrates the link between the r*esources* category and the *research climate* category also illustrated in Figure 4.5.

Table 4.32: Statistical services and research resource centres: A summary table of participant responses to questions 8, 9 and 21 of the open-ended questionnaire on the effect of *research resources* and *research resource centres* on ROP

Question 8	***Please indicate the type & extent of statistical support which you perceive, in your capacity as researcher (manager, editor/ reviewer, statistician) that researchers require from a statistician,*** *with extent indicated as* *1= not at all; 2= from time to time; 3= 50% of the time; 4 = to great extent; 5 = always*

Stats services required	Researcher	Statistician ()[##]	Editor/ reviewer	Manager
1. Consultation service of statistician	5	5 (4)	3	5
2. To design questionnaire	4	4 (4)	3	4
3. To do statistical analysis	5	4 (4)	3	3
4. Written report on stats analysis & interpretation	5	4 (2)	5	4
5. Written analysis strategy to include in article	5	4 (2)	5	3
6. Statistical editing of analysis section of article	5	4 (2)	5	3
7. Respond to feedback of journal reviewers	5	4 (2)	2	2
Mean rating per environment-perspective	4.9	4.1 (2.9)[##]	3.7	3.4
8. Do own analyses, no services required	1	2	2	2
9. Statistician as co-author of articles	1	2	2	4
10. To submit article to journal	4	4 (1)	2	4
11. Only ad-hoc statistical queries	1	2	3	2
[##]: The second set of rating values was provided by a statistician that resides at an Institution with a Research Resource Centre. Duties and responsibilities between the two universities differ				

Conclusion: Role players closely associated with the research process regard statistical services as essential. A tendency seems to exist for *role players* further removed from the *research process* (other environments) to rate statistical support as less essential. (The responses show relationships with categories of *knowledge, role players, resources*)

Question	***Do you believe as a researcher (manager; editor/ reviewer; statistician), that a research resource centre at an academic institution has the potential to impact ROP?***			
	Researcher	**Statistician**	**Editor**	**Manager**
Response	* Academic institutions with a high RO rate have Resource Centres/ Statistical Services (UJ and UP for example) 'Will be worthwhile to look into this in more detail' (Researcher D)	* Statistical resources/ a resource centre are essential components towards successful research completion and publication * Resources, namely expertise is required to improve quality and quantity of RO. More statisticians in particular are required	Research expertise (at an institution) has the potential to impact productivity and research quality	* Absolutely * can enhance and expedite research efforts
Conclusion: Analysis of responses suggests that *research resource centres* impact article publication (verify that a relationship exists between *resources, research process* and *ROP*				

Question	***In which capacity (****research team member; ad-hoc statistical services; a technician producing analyses; no role)* ***do you feel the statistician best serves a successful research project?***			
	Researcher	**Statistician**	**Editor**	**Manager**
Response	Ad-hoc/advisory	Fulltime research team member	Ad-hoc/ advisory basis	Full time/ ad hoc
Conclusion: Albeit different service-expectations are indicated, all responses verify the value of *research resources* and statistical support**.**				

4.4.4 Has the open-ended data source succeeded in advancing theory development?

Analysis of the open-ended questionnaire data source clarified certain theory development issues (Section 4.3.1) regarding categories, their dimensions; additional conceptualisations; and relationships between and within categories (or theoretical code). The most important deductions

are listed below to illustrate how analysis of the open-ended data source advanced theory development:

- *Environment:*

The analysis cycles indicated that an *environment* category is relevant to ROP theory. The analysis identified perception-differences (regarding RO and ROP) between *institutional* and *departmental* environments[74]; the *editorial* environment and *research environment*. It can be deduced that the capacity in which a person serves research – his or her vantage point, and thus *environment* – affects perceptions and interest in ROP.

- *Research delimiter:*

Responses of the open-ended questionnaire verified that the *researcher environment* of the overarching *environment* category presents as a sensible research delimiter in continued analysis (discussed in Chapter 5). This reasoning stems from the fact that the interest of this study lies with ROP factors that directly concern the researcher[75]: factors that the researcher can address or rectify or acknowledge or improve on. The researcher environment will therefore best inform the research. In this way the overload of information sampled from the two main data sources up to this point can be narrowed down to provide a more detail model of ROP.

- *Role players*

A consequence of narrowing down the research field is that *role players* are also delimited to those players more directly involved in the *research process*.

- *Relationships:*

Relationships between categories were identified (compare Table 4.29). For example, analysis suggests that the type of relationship the *environment* category shares with other categories is an underlying relationship: the vantage point has a ripple effect on perceptions of 'doing research'.

- *Core category relationships*

Of cardinal importance to continued theory development (to be described in Chapter 5) is the suggested central role of the *research process* to article publication in the early literature-analysis cycles of research. This initial suggestion was strengthened in the open-ended questionnaire analysis cycles which indicated that the *research process* relates to all or to most other categories (Table 4.29). Chapter 5 will incorporate the findings of the properties of the *environment*-category and *core category* to delimit research to the *researcher environment* and, by delimiting to the *researcher environment,* the *research process* features as the prominent component in producing and publishing articles. In this way the *research process* forms the backbone of further development of ROP theory in Chapter 5.

- *Research process:*

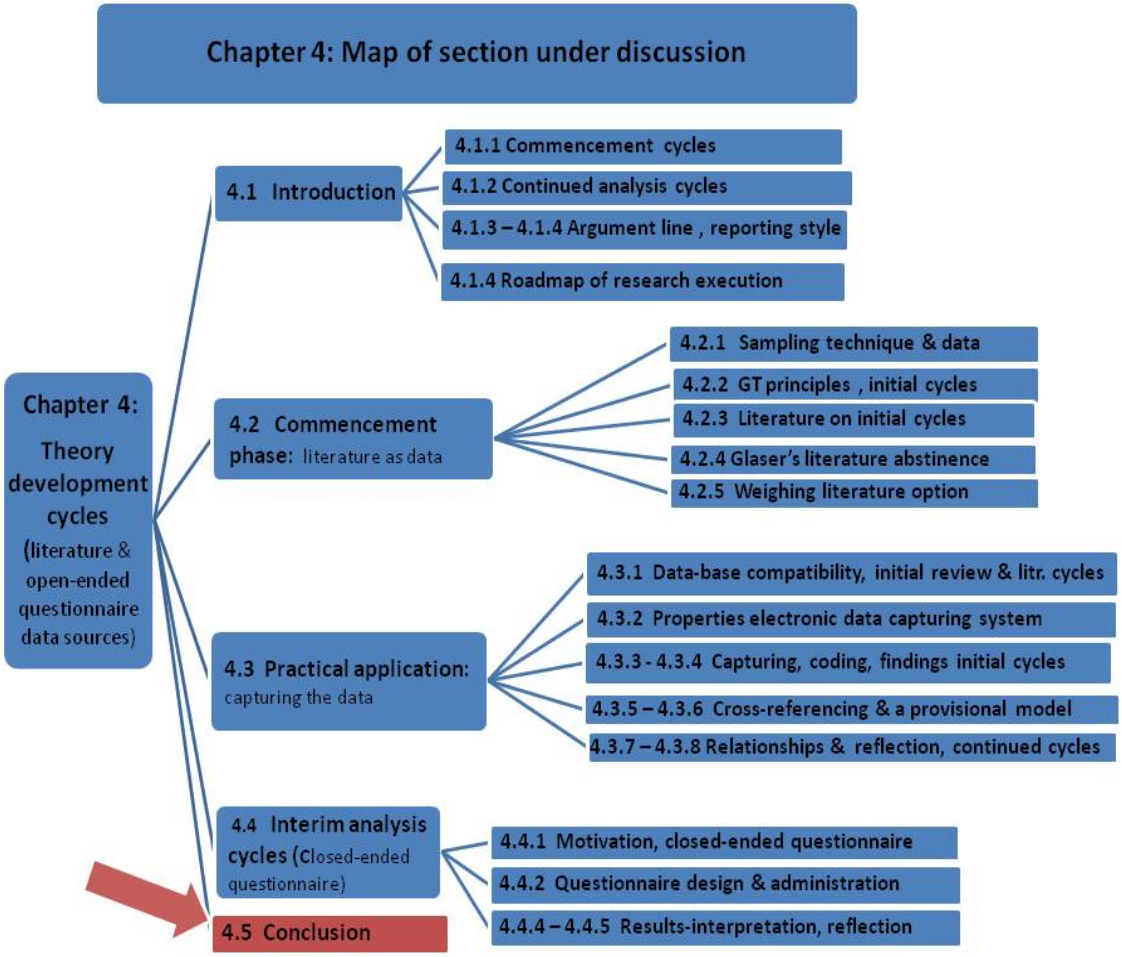
The analysis of responses contributed to the realisation that research *practice and process* present as separate GT categories not only because a distinction eases the description of relationships between categories but primarily because the concept of a *research process* was interpreted as procedural steps; and *research practice* was interpreted as the way in which individual researchers uniquely implement the *research process*: how he/she operates (a collaborative style; means of communicating; networks; preferred research design; etc. Ynalvez and Shrum 2011:204-215).

[74] Li (2012); Bronfenbrenner refers to macro, meso and micro environments which seem analogous to government, institutional, departmental and researcher environments of this study – this is detailed in Chapter 5

[75] This delimited environment accommodates the perspective of the research support statistician – the research approach of this study.

In this way the issue of separate categories was clarified using information from the open-ended questionnaire data source. The conclusion can thus be drawn that the open-ended data source served to advance theory development by clarifying specific aspects of relationships and categories.

4.5 Conclusion



Chapter 4 argued the use of literature from the introductory literature review as a commencement data source for this study. The argument averred that bias would not be introduced in the theory development of this study by sourcing the literature since limited theory on ROP exists in the literature, especially when viewed from the perspective of a research support statistician/the statistical support community (which is the research angle of this study). Furthermore, the literature in other research fields reports on successful theory development in instances where the literature served as commencement data source in GT implementation (Section 4.2.3). These examples prove that utilisation of the literature as commencement data source can be a very fruitful approach.

Analysis cycles using the literature as data source: research commencement

This chapter then drew attention to the cyclic nature of GT methodology and indicated that these analysis cycles would be reported in a more linear fashion in this thesis. This is followed by relating how the data from the literature data source was practically captured, analysed, continually updated and re-analysed (coded and compared). The analysis cycles resulted in the emergence of conceptualisations which led to higher levels of abstraction and identification of ROP categories

along with their subcategories/ dimensions and properties. How these conceptualisations developed from initial ideations and suggestions of possible categories to more clearly defined structured concepts is presented by means of various tables compiled from programmatically compared data events (related to ROP) that describe individual concepts.

Table 4.29 presents a final summary of initial theory development based on a developed literature database. This framework of categories served as initial attempt to model research output productivity. Theory development up to this stage is diagrammatically illustrated in Figure 4.5. The initial literature review of this study contributed substantially towards the structuring of an initial model of ROP which suggested that certain elements, such as the *environment*, the *research process*, *knowledge* and *role players* constitute central elements of the ROP theoretical model.

This initial framework, however, gave raise to several critical issues regarding the evolving theory that required serious consideration. To further the research by addressing these issues, additional information had to be sourced from an informative data source. Clarity, for example was required on whether *environment*, with the dimensions of global and government, institutional, departmental and research milieu, presents as a category of ROP that can be applied to delimit the volume of data collected in the commencement cycles of GT implementation.

Analysis cycles using responses to an open-ended questionnaire as data source

The second section of this chapter, Section 4.3, lists the particular issues[76] that require further clarification. Section 4.3 then continues by motivating responses to an open-ended questionnaire as an appropriate data source to collect informative data. The section explains how these issues formed the structure of an open-ended questionnaire designed to inform these issues. In addition to clarifying specific conceptualisation of the initial theoretical framework, focus in continued analysis cycles centred on identifying, more explicitly, and noting relational links between categories and the nature of relationships. For example, the suggested *underlying* type of relationship that e*nvironment* exhibits towards other categories were investigated and verified. Another kind of relationship, namely that of the interconnected nature of the core category - *the research process* - to all other categories evaluated and confirmed. Although only a limited number of open-ended questionnaires were theoretically sampled and analysed (in agreement with GT methodology) the open-ended data source succeeded in clarifying important issues and verifying emerging ROP categories as categories and dimensions of ROP theory.

This chapter concludes by indicating that ROP theory development has not yet reached a saturation point and that the evolving theory from the literature and open-ended data sources asks new questions of the still-evolving theory. How new issues are addressed is explained in Chapter 5 Chapter 5 explains how continued analysis cycles are conducted in a delimited research field and how responses to a closed-ended questionnaire serve the purpose of refining and presenting a theoretical model of ROP.

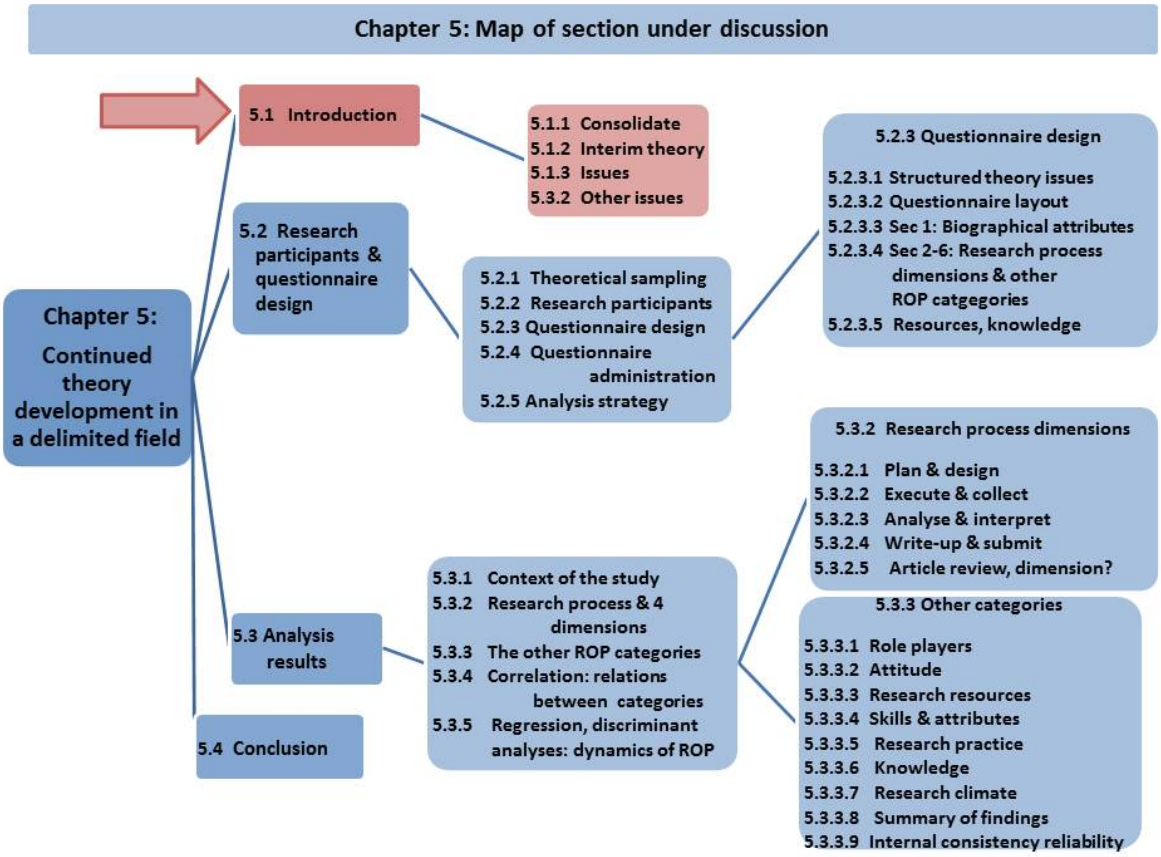
(The appendices to Chapter 4 are included in the General Appendix at the end of the thesis)

[76] Issues arising from the commencement phase analysis.

Chapter 5

Continued cycles of theory development in a delimited research field: sourcing responses from a closed-ended questionnaire

5.1 Introduction



5.1.1 Consolidation of the research approach up to this point (Chapters 1 – 4)

Chapter 1 to 4 motivated the importance of effectively publishing research – as academic articles - and the need to identify events or factors that impact on publication. Equally important to such an investigation is the dynamic interaction between these factors. The discourse furthermore argued that interest in the publication of research is motivated by diverse drivers which acted as a first indicator that the capacity in which a person serves or the vantage point of a person affects what people perceive as impacting on ROP. In this respect, Chapter 1 motivated the vantage point of a research support statistician as an appropriate approach in this investigation. It was argued that such a perspective echoes a specific, grassroots voice to ROP based on the fact that researchers and support statisticians work in close collaboration to ensure quality research. It was argued that the capacity in which the researcher of this study serves, namely, a consultative research support-

capacity, placed her in a unique position to practically observe events and circumstances that influence how research can effectively be conducted and findings published as academic articles[77].

Chapter 2 argued for GTM as an appropriate methodology for investigating the phenomenon of research output productivity, the argument being that GTM is ideally suited to develop theory in a little researched substantive field. This applies to the ROP investigation at hand; especially viewed from the motivated perspective of a research support statistician/the statistical community. This perspective considers the grassroots dynamics of conducting research: planning, executing, analysing and publishing of research findings in accredited journals. The chapter furthermore argued the timing, positioning and format of a literature review in GT research explaining the stance of this research on the timing of a review and proceeding with an introductory review on ROP.

Chapter 3 next focused on the methodology of GT and more specifically the classic grounded theory version found to be best suited to the research setup of this study. Once a classic grounded theory approach for this study had been decided on, Chapter 4, in turn, argued for the suitability of using the literature of the introductory literature review as commencement data source for this research. The chapter continued by describing the literature was analysed and a literature-database developed. The ensuing GT analyses – which consisted of cycles of manual coding of literature events and manual and programmatic comparison of generated open and conceptual code - led to the compilation of an initial theoretical framework for ROP. This initial framework was reported in tabular format (Table 4.29 of Chapter 4) and also visualised (Figure 4.5) to consolidate preliminary concepts and relationships that model ROP.

As can be expected, this initial ROP model was, in many respects, vague and not clearly defined. Specific issues regarding the emerging theory required further clarification. To this end additional information had to be collected and analysed. The argument in Chapter 4 reasoned that theoretical sampling at this stage would be appropriate to investigate specific issues of theory development which would require sampling information selectively on these issues. To this end, responses to an open-ended questionnaire - designed to collect information on the specifically noted ROP issues – formed a further data source in this study. The issues of concern at this stage focused on:

- Conceptualisations (should specific concepts be regarded as categories or properties and dimensions of developing ROP theory?) and
- Relationships (How should the relationships and links between and within categories be described?)
- Another critical concern – raised by the literature analysis cycles - asked whether perceptions of what impacting events on ROP constitute are vantage-point dependent (for example, managers, researchers and journal editors have different interests in publication figures: researchers are interested in the discovery of new knowledge; managers have to balance teaching and research responsibilities within a department or institution and journal editors have the standing of their journal to uphold).
- The issue of the impact of vantage point or position on ROP furthermore raised the question whether the vantage point of interest groups represents different environments. Initial literature

[77] Field notes on researcher-statistician interaction in consultation sessions were recorded over a period of 14 years by the researcher of the study. In this study it is assumed that the input of the academic researcher was of critical importance being the person that executes research and publishes articles.

analysis cycles suggested *environment* to be a category of ROP theory. Continued interim analysis – open-ended questionnaire responses – confirmed that the position people serve in equates to a particular environment structure. In this way the cycles of analysis of open-ended questionnaire responses verified that e*nvironment* forms a category of developing ROP theory.

- Knowledge gained in this process led to an additional question: whether the *environment c*ategory could serve as a research delimiter in continued analysis cycles to refine and saturate ROP theory development.

The results of the analysis cycles reported in the second half of Chapter 4 (using responses to an open-ended questionnaire as data source) were able to verify *environment* as a ROP category and motivate the *researcher environment* dimension (and a statistical perspective) as the delimited substantive area for further research. The reason for the researcher environment as delimiter was based on the fact that the researcher ultimately executes research and publishes his/her findings: the ultimate grassroots approach and focus of this research. The importance of the researcher in this investigation should be seriously acknowledged.

The research presented in this chapter, Chapter 5, expands on the ROP theory developed by means of the literature review- and open-ended questionnaire data sources. The discussion in this chapter will indicate how interim ROP theory (Chapter 4) – now delimited to the *researcher environment* (Chapter 5) - is verified, densified and refined by means of the cyclical analysis of response data collected from a (still to be designed) closed-ended questionnaire (another data source) and supported by field notes of the researcher of this study on researcher-statistician interaction discussions.

The cyclical and iterative nature of GTM referred to in previous chapters also applies to the reporting of analysis results in Chapter 5. Although research findings are presented in a linear fashion in Chapters 4 to 6, the enrichment of ROP theory reported in Chapter 5 is not singularly accomplished by collecting and analysing newly acquired data (closed-ended questionnaire responses). In the analysis cycles of the eventual theoretical model (Chapter 5), analysis also reverts to comparing newly acquired knowledge to information sampled and analysed earlier using other data sources (the literature database and response-data of the open-ended questionnaire).

Chapter 5 is structured to (i) recap on theory development up to this stage. As is customary in GT methodology the research will also indicate how the research topic and research questions were adapted from the initially formulated questions to align with developing theory. The summary of theory development is then used to highlight (ii) issues that require further investigation within the to-be delimited substantive *researcher area*. The chapter then argues that additional information on the listed issues should be sampled theoretically to enrich ROP theory development. The argument of the chapter will motivate a (iii) closed-ended questionnaire as an appropriate measuring instrument and motivate the questionnaire design against the backdrop of specific issues that require clarification. The chapter will conclude by describing, in step-wise fashion, the (iv) analysis techniques implemented at particular analysis stages; how theory was gradually refined with insight gained from analysis findings; and, how new questions were continually asked of the evolving theory. Such questions in turn call for further analyses which replicates the analysis cycle. The next section summarises theory development up to this point.

5.1.2 A recap of initial and interim ROP theory development

Before this chapter discusses how theory on ROP is further researched and refined, a short recap on theory development in the commencement and interim analysis cycles of research is provided in the ensuing paragraphs. At the onset of this discussion it should again be emphasised that theory developed and reported on in Chapter 4, collected and analysed data events linked to all aspects of 'doing research' that aim at publishing findings in accredited journals. Collected data and evolving theory therefore directly link to events that impact on effectively producing research findings and the publication thereof. The findings summarised in the next paragraph (and in the second column of Table 5.1 that follows) structure and explain the dynamics that impact on ROP – the title of this thesis.

The most critical elements of interim theory development derived in Chapter 4 show:

- *Theory defined in terms of categories and relationships, and research delimiters*
  Theory development and the formulation thereof in Chapter 4 mainly focused on (a) defining conceptualisations derived from subsets of open and conceptual code that suggested underlying concepts. Theory development also aimed at defining emerging concepts in terms of categories and dimensions; and (b) in the identification and description of preliminary relational links that emerged between and within categories. Furthermore theory development, in the interim cycles, (c) acknowledged that data sourced in the initial and interim cycles generated an overwhelming amount of information on RO-related events and had to be limited. The sheer volume of information posed a problem to logically analyse, develop and formulate theory. The collected data was too general and too voluminous. A further critical finding of Chapter 4 indicated that the volume of 'redundant' data could be addressed by identifying a category of the developing theory which could act as a delimiter of the research field. In this way the research field could be narrowed down and the volume of data reduced in continued research to be described in Chapter 5.
- *The environment category as delimiter*
  Research in Chapter 4 established that *environment* constitutes a ROP category with sub categories/dimensions of a *global/international* research environment; an *institutional* environment; a *departmental* environment and a *researcher* environment. Environment plays a crucial role in refining ROP theory since perceptions of ROP and impacting ROP effects are environment-dependent. By narrowing research to the *environment of* the *researcher,* a grassroots perspective of the dynamics of ROP can be obtained. The dimension of the *researcher environment* of the *environment* category was therefore identified as the research delimiter in continued theory refinement. (In this chapter, Chapter 5, further research is therefore delimited to the *researcher environment*).
- *Naming emerging categories*
  Uncertainty about the labelling of conceptualisations (a) was clarified to a great extent as stand-alone categories or dimensions of a category. ROP categories identified in initial and interim theory development include *environment;* the *research process*; a stand-alone *research practice* category; *skills and attributes* (which includes the concepts of competencies, ability, attributes of researchers); *attitude towards research*; *knowledge* (which includes the components of subject-specific knowledge, statistical literacy, research knowledge and experience; publication

experience[78]; *research resources* (which includes the concept of research resource centres); *research climate*; and a stand-alone *research role-players* category.

- *Identifying preliminary relationships/ relational links*
  Relational links mentioned in (i) (referred to as theoretical code in GT methodology) and identified in the interim research, indicated that different types of relationships describe the dynamics of ROP: for example, direct and indirect links to the *research process* category; relationships that relate to several or all categories – the attributes of a core category; underlying types of relationships – for example, the *environment* category (vantage point has a ripple effect on perceptions of 'doing research'); relationships that can be described as sequential or process-like, for example, the *research process* category, the article review/publishing process and the ethical clearance process (Figure 4.4 and 4.5 of Chapter4).
- *Core category identification*
  The initial suggestion of the literature analysis cycles that the *research process* category acts as the core category of ROP theory was strengthened by the interim analysis cycles of the open-ended questionnaire responses (Table 4.29). With the core category identified, a preliminary framework for the ROP theory could be compiled.
- *Research question refinement*
  Apart from the need to clarify uncertainties, continued analysis cycles are also guided by the research question of the study, which was tentatively stated in Chapter 1 as asking:

> 'What factors and/or events associated with the research process or within the research process impact on research output productivity?' (Chapter 1 section 1.6.1)

The question was refined and repeated in Chapter 3, prior to research execution, asking:

> 'Viewed from the perspective of a research support statistician in the research process, how do factors and/or events related to and within the research process affect research output productivity?' (Section 3.2, Chapter 3)

- *A preliminary ROP model and further areas of uncertainty*
  Figure 5.1 visually summarises the preliminary ROP model developed in Chapter 4 and Table 5.1 describes the components of the model. The table and diagram (Figure 5.1 and Table 5.1) were adjusted from Table 4.29 and Figure 4.5 of Chapter 4.

Layout of Table 5.1: a preliminary ROP model and issues that require further investigation

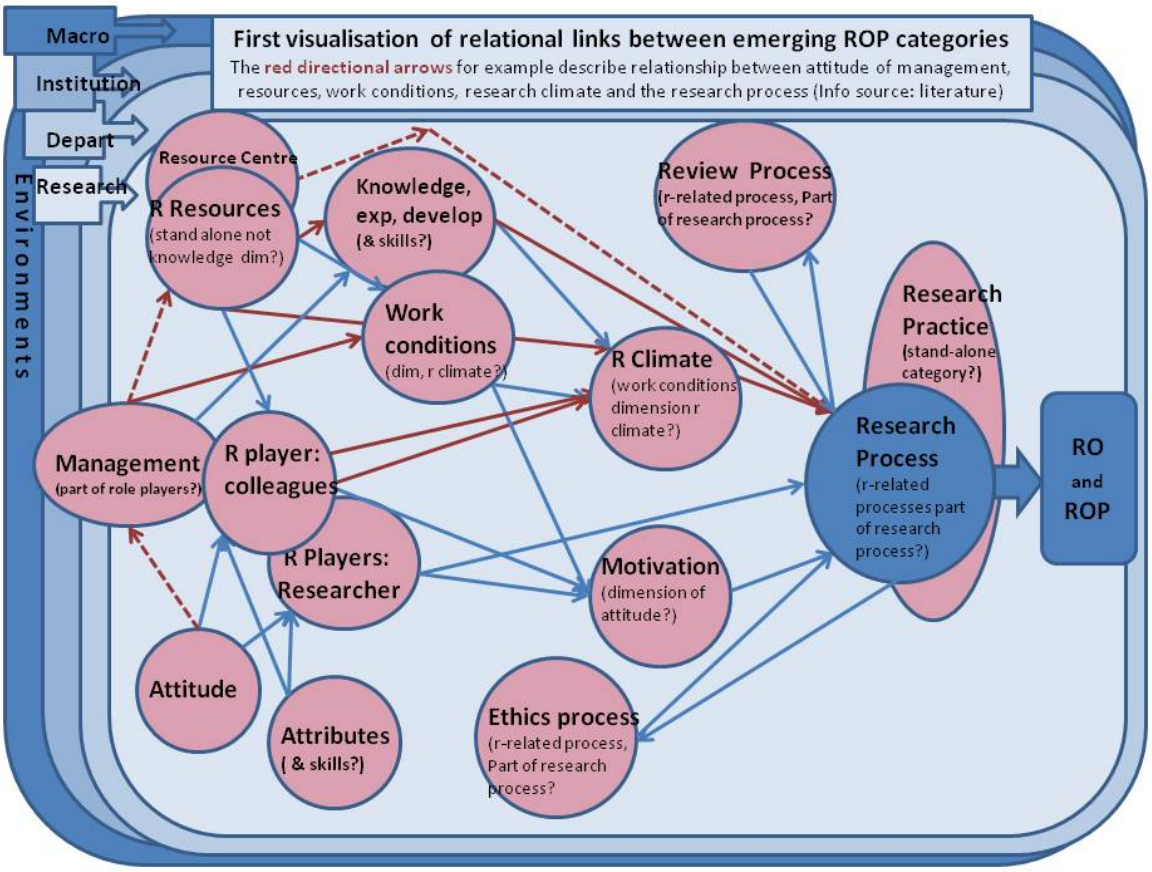
Table 5.1, column 1, lists the various categories identified and densified in the commencement and interim analysis cycles reported on in Chapter 4. The second column of Table 5.1 details the most prominent attributes and relationships of these categories. For example, the column 2-entry for the *environment* category notes that this category has dimensions of *government, institutional, departmental and researcher environments*. The category also interacts with/or influences/or is influenced by all other ROP categories. The first two columns of Table 5.1 therefore summarise interim theory development. The purpose of this summary is to compare, logically, the components of the emerging theoretical model to additional questions asked of each component. This is

[78] The literature also refers to this type of experience as publication- or research savvy.

recorded in Column 3 of Table 5.1. (For example, an entry in column 3 of the *environment* category asks whether the *peer review* and *editorial environmen*t should be regarded as part of the part of the *researcher* environment).

The logical ordering of aspects that require further clarification can then be used to design a data collection instrument to source relevant and specific information to clarify these listed issues. In this way continuing analysis cycles are guided and will contribute towards enrichment of the preliminary theoretical model on ROP.
Based on this information Section 5.1.3 motivates further research, the results of which are discussed in Sections 5.3 to 5.5 of this chapter.

Figure 5.1: A visual summary of the preliminary theoretical model of ROP developed in commencement and interim analysis cycles (literature and open-ended questionnaire data sources) [79]



[79] In section 4.3.6 and 4.3.7 of Chapter 4, 'A provisional model of theory development on ROP' and 'Explaining relational links as a component of ROP theory development' the reasoning followed in the compilation of the theoretical model visualisation is explained

Table 5.1: A summary of interim theory development (based on the Table 4.29 framework)

Summary of interim theory development based on the theoretical framework derived from Table 4.29 (columns 1 and 2). Column 3 lists issues that arose from the interim development and that need to be answered in continued/ advanced research.		
Interim categories & dimension of ROP	**Interim theoretical code Table 4.29** (literature review- and open-ended sources)	**Issues to resolve in continued research towards theory refinement, Chapter 5** (closed-ended & field notes data sources)
Environment • **Dimensions/ subcategories** - Global/ government - Institutional - Departmental - Researcher environment	nvironment is a ROP category with sub categories e *researcher environment* sub-category can be used to delimit the substantive area in further GT analyses e *researcher environment*-dimension underlies all categories listed in Table 5.1 and determines how conducive a set-up is to research: e.g. research-orientated experienced colleagues (*role-players*) share (*attitude, research climate*), motivate (*attitude*) and collaborate (*research practice*) with others; transfer knowledge, experience, skills (*knowledge, skills*); provide research resources favourable for research (*resources, role players/* management, r process)	an ROP theory be refined within the delimited area? an the volume of 'general' information collected in the initial and interim cycles of theory development be reduced to more detail and specific information towards enrichment and saturation of the ROP theoretical model? ould the *editorial/ peer review/ publication* environment/ process be included in the *researcher* environment for the purpose of this study? es the *peer-review process* form a dimension of the *research process? (write-up & submit dimension of the research process)* *managers* form a dimension of *role-players* and is this different from *management*?
Research-related processes • **Types of processes** - Research process - Ethical clearance process - Peer review/ Editorial process • **Structure of process** * Research process - Plan & design - Execute & collect - Write & submit * Ethical clearance? * Editorial?	*esearch process & Research practice* are standalone categories *hical clearance* forms a dimension of the *research process* *ole players* not components, *research process* category but standalone category *anagers* dimension of *role players category,* not component of, *management* *esearch teams* dimension of *role players category,* but ' teamwork' dimension *of research practice* uggestion that *research process* is core category of ROP theory *esearch process* interacts with *- Research practice; - environment;* *- management; - research support;* *- knowledge (development); - Skills & attributes (motivation); - Attitude*	• Quantitatively verify that the *research process* category is the core category of ROP theory • Quantitatively determine the nature of relational links of *the research proc*ess with other categories • Does the *research process* present as a kind of procedural category (as opposed to the individualised *research practice* category? • Confirm that the *ethical (clearance*) process forms part of the *research process (via plan & design dimension).(*That ethical conduct resorts under *research practic*e category: ethical conduct; ethical research; research integrity) • Verify that article submission part of *research process* category (the write-up & submit dimension). • Is an *editorial process* – as standalone category - relevant in a researcher delimited substantive field to ROP?
Research practice • **Practice-styles** - communication - networks - collaboration - teamwork/ solo work - develop & train ?	• Research practice a standalone ROP category • *Research practice & research process* interact*(research practice* is applied throughout the procedural steps of the *research process* – the personalization of research – therefore categories that	• Do elements of behaviour, e.g. work integrity, ethical conduct, professional conduct, research integrity, quality research, honesty, correct methods, represent the conduct dimension of *research practice*? • Do personalized ways of doing research constitute a 'practice-style' dimension of the *research process*? (Collaboration, team or solo work, ethical, mentor,

- mentor; - r habits - use resources • **Research conduct** - Ethical; - responsible - professional conduct - respect team - research principles	interact with the *research process* also interact with *research practice)* • Ethical conduct rather part of *research practice*? Yes • Development & training rather part of knowledge category?	supervision, share, grow)? Rather standalone Develop theoretical code/ verify: • *Ethical conduct* resorts under *research practice*? *esearch practice* interacts with *the research role players* category (teamwork, communication, collaboration) erify *research practice* as a standalone category

Researcher skills and attributes • **Types** - Skills & Competencies (abilities, e.g. English proficiency; experience knowledgeable) - Biographical traits (e.g. motivated ; intrinsic traits; work habit traits: hard worker, meticulous, persevere) - Academic properties	• *Skills/ attributes* standalone ROP category • Motivated mindset, element of *skills/ attributes;* motivational drivers (e.g. promotion) part of *research climate catg.* • *Skills & Attributes* interacts with: - *Environment (*motivational mindset) - *management* (motivational mindset) - *research practice* (work habits) • *Research practice* traits resorts under *research practice category* • *Knowledgeability,* a competency of *skills category,* but 'knowledge' of researchers resort under *knowledge category*	▫ Is a motivational mindset an element of the *skills and attribute* category and a motivational driver (e.g. promotion), an element of the *research climate* category?

Researcher attitude • **Attitude towards:** - research responsibilities - statistics - knowledge, experience - develop of knowledge - use of support services - research integrity/ethics - r practice - research process	▪ *Attitude a separate ROP category* ▪ *Attitude* interacts with - *role players* - *research process* - *knowledge* - *research resources* - *research practice* - *motivational mindset* - motivation (a category?)	• Evaluate whether *attitude* affects use of *research resources,* in particular *statistical resources* – focus of study: services support statistician & resource centre • In delimited context, elements of funding, IT equipment, funding, mentors, are included. Correct? • Evaluate negative perceptions of *stats/ -services* reflected in field notes of researcher. Will evaluation of negative perceptions affect interpretation of analysis cycles? • *Verify* listed interactions (column 2)and also *attitude* interacts with: - *Peer review* process (attention to reviewer critique); - *Skills/ attributes* (dedication, etc.)

Knowledge • **Types of Knowledge** - Formal knowledge (subject specific, stats, research knowledge, article submission) - Experience (research & publication savvy) - Development of knowledge (training, exposure, availability)	▪ *Knowledge* is a separate ROP category • Sub categories of knowledge include, *formal knowledge, experience, development* • *Knowledge (*development of knowledge) interacts with *research process, practice, skills & attributes, resources, role players, management* Essential component of ROP • *Skills-capabilities/ knowledge* is not a dimension of *knowledge category*. Rather the *skills* category and the *knowledge* category interact	▪ Verify: *Knowledge i*nteracts with - *research process* - *peer-review & submission process* - *role players* and other listed categories in col 2 ▪ Is k*nowledge* a *resource* or does one use r*esources* to obtain *knowledge*? Thus separate categories? • Verify: Statistical competence is a dimension of the *skills/attribute* category – not a sub-dimension of the *experienced knowledge* category. Rather, *skills* (statistical competence) and *knowledge* interact [How is access to *knowledge* accommodated? Another dimension of knowledge? No, a *resource*]

Research Resources, • **Types of resources** - Research infrastructure - Physical r. support - Access to knowledge (manuals/ text books/ seminars/ conferences) - Research resource centre	• *Research resources* and *research resource centres* jointly describe the research resources category • *Resources* include stats services; also funding, administration, training, exposure, access to knowledge, resource centres, etc. • In delimited substantive field more attention services in *research process*, e.g. stats support	• Verify: Research resource centre, a dimension of *research resources* category • Verify, *work conditions* rather *research climate* category than *research resources* category? (Yes) • Verify *research resources* interacts *research climate* • Also verify that *research resources* interacts with: *- role players; - research process*

Role players • **Impact dimension** • - Internal to researcher env. - external to researcher env. • **Type dimension** - researcher - managers - colleagues - co-researchers/team - statisticians • **Responsibility dimension** • **Properties dimension**	• *Research role players* a standalone ROP category • *Managers a* dimension of the role player category; different from a *management* category • *Role player* category interacts with *- research process;* *- research climate;* *- research practice* *- knowledge* *- attitude;* *- research resources*	• How relevant is *managers* (role player category) and *management (*category) in the delimited substantive area? e.g. managers provide *research resources* • Role responsibilities resort under *research practice* or *research role players*? (=role players) • Verify that 'team approach', a *research practice*; but that *research teams* are *role players* • *Role player* characteristics part of *role players* category, or *attributes & skills* category?(Rather dimension, *role player*: skills *category* of researcher) • Rather assume, *researcher skills/ attribute* category interact with skills dimension of *role players* category

Research Climate • **Approach/ attitude** of role players • **Research background**/ conditions/ discipline • **Work conditions** Sub-dimensions (drivers, work load, research time, autonomy, opportunities)	• *Research climate* a standalone ROP category • *Research climate* interacts with *- management; resources* *- role players* *- knowledge* *- skills & attributes* *- research process* *- research practice*	• *Research climate* still relevant in delimited researcher environment? • Drivers not part of skills category, rather *work conditions* dimension of the *research climate* category (academic recognition. Incentives/ rewards, IPMS, example set by peers, expectations, etc.) • *Work conditions* not dimension of *research resources category* rather *research climate* category
Management **Dimensions of** • **Facilitates/ provides** • **Motivates, monitor** • **Guides**/ determines direction of research	• *Management,* standalone category • *Management* interact with *- environments* category *- research resources* category *- research climate* category *- knowledge & development* *- research practice; - role players*	• Is the *management* category still a relevant category in the context of the delimited field? Yes Management facilitates research resources; knowledge development/ exposure; work conditions, appropriate staff appointments • Management category not tested in the closed-ended questionnaire – a given - effect is felt in all environments
Identified ROP Categories: Environment; research climate; management; research resources; research-related processes; research practice; editorial process; knowledge; attitude; skills and attributes		

5.1.3 Consequences of the ROP issues raised in the third column of Table 5.2

The recap of Chapter 4 theory development in Section 5.1.2 offers an opportunity to logically structure the issues asked of developing theory in such a way that continued cycles of analysis – to be presented in this chapter - can effectively address these issues. The main concerns of the

research at this point focused on narrowing research down (Section 5.1.3.1) in a way that best serves the objectives[80] of the study, and on refining the preliminary theoretical model on ROP(Section 5.1.3.2) by clarifying uncertainties highlighted in Table 5.1. An appropriately delimited research field – discussed in the next section - will ensure that relevant information is more effectively collected and areas of uncertainty explained.

5.1.3.1 The general nature of collected data warrants delimitation

The preliminary theoretical model explained in Table 5.1 was developed by sampling data over a broad substantive area. The data events present the perspectives of diverse parties with an interest in research. According to Charmaz (2012:101), a wide range of opinions (or data events) of a concept in initial model building is desirable to ground and test emerging conceptualisation because concepts have to accommodate many variations of eventualities (robust concepts). However, as the cycle of analysis and data collection continues and theory crystallises, more specific questions are asked of evolving theory that remain unanswered by large amounts of general information. During these analysis and data collection cycles, the nature of data required to inform theory advancement moves from general to specific (Charmaz 2012:101). This translates to narrowing the research to areas where data events provide a detailed understanding of pressing issues of developing theory.

Section 5.1.1 motivated the *researcher environment* as the delimited substantive area of this research. The *researcher environment* narrows the investigation to the area where researchers engage in research and produce research output. The *researcher environment* represents events and circumstances that researchers themselves, or their close research community, have more direct control over to improve or rectify or change. The voice of the researcher in the researcher environment represents the interest field of this study and should therefore take precedence in continued research[81]. Delimitation in this manner therefore suggests an option for an additional data source in continued analysis cycles: the perceptions of the academic researcher who does the research and role players directly involved in the production of research (which would include for example co-researchers and statistical support services). The identification of an additional data source-option simultaneously raises the questions of how data should be theoretically sampled from this data source and what data collection instrument should be used. A closed-ended questionnaire designed to address Table 5.2 issues presents as an option.

Before pursuing the option of the suggested data source and collection instrument, this subsection concludes by visualising the status of the theoretical model at this stage when the decision was taken to delimit research to the *researcher environment*. The diagram visualises theory development as presented in Chapter 4, but without the *macro-government, institutional* and *departmental environments* displayed. This visualisation does not imply that these environments are not present but indicates that focus shifts to the *researcher environment.* Continued research has to determine how this picture in the researcher environment will be refined and enriched in advanced analysis

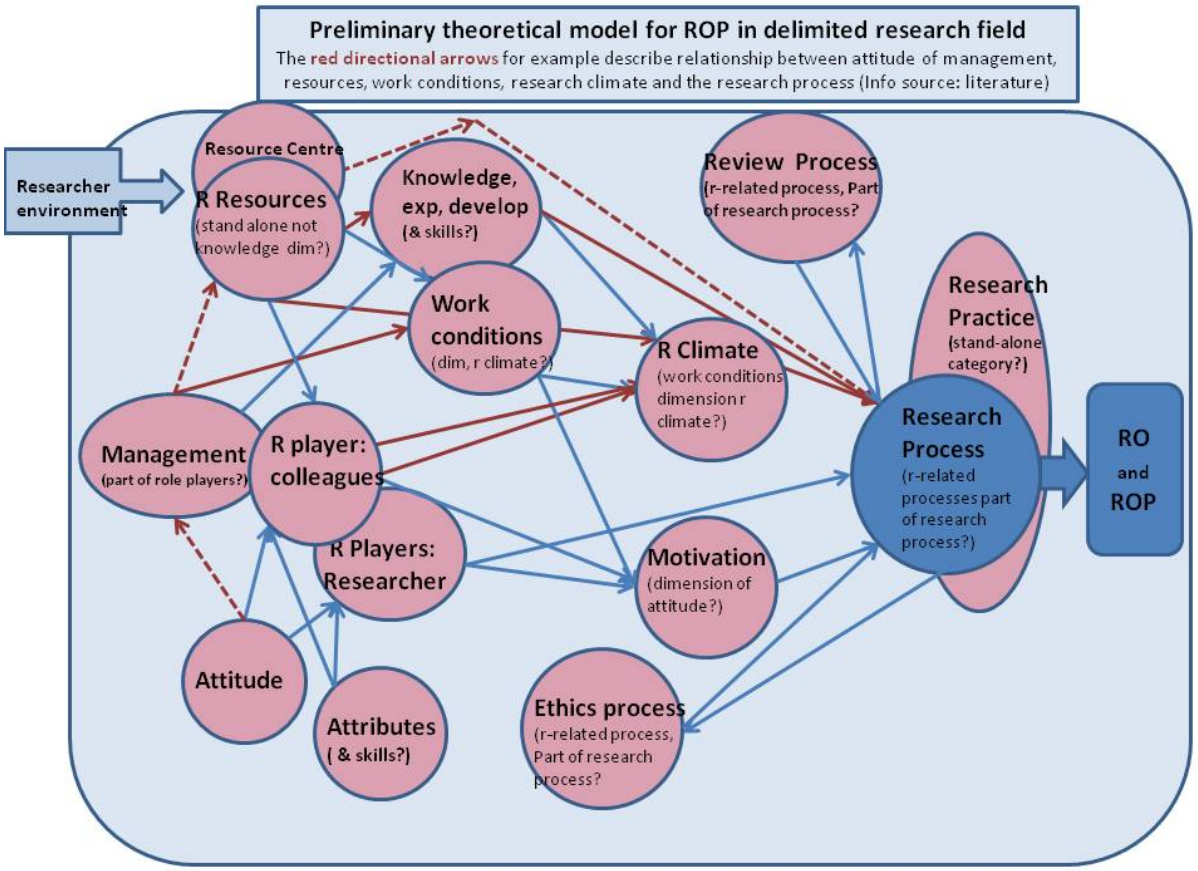
[80] The objectives of the study are reflected in the title of this thesis: 'Mapping the dynamics of ROP: viewed from a statistical perspective'. In other words, identifying impacting effects, and the relational links between these effects, that explains the dynamics of the process of producing and publishing academic articles.

[81] The delimited research field corresponds to the research angle of this research, as expressed in the title of the study, 'Mapping the dynamics of ROP: viewed from the perspective of a research support statistician'

cycles. Charmaz (2012) indicates that theory is constantly adjusted as new information becomes available and is incorporated into the theoretical model.

In Figure 5.2 the coloured circles (and their positioning) represent categories (and dimensions) that emerged from the more general data collected and analysed from the literature and responses (of a broader research community) to open-ended questionnaire questions. The directional arrows indicate relational links suggested by these sources. For example, the red, broken-line directional arrows depicts the impact on or relationship between managers' attitudes, research resources and the research process (another relational link between the attitude of managers and the research process could be mapped as: management-attitude towards research that facilitates research resources, which, in turn impacts on the working conditions of academic researchers and the research climate. This in turn impacts on the research process and publication of academic articles. The concluding section of Chapter 5 will report on an adjusted Figure 5.2.

Figure 5.2 Interim ROP theory development set in the delimited *researcher-environment* substantive area



5.1.3.2 Classification of theory-issues suggests a data source, data-collection instrument and framework for the instrument

To guide continued research, the ROP issues listed in Table 5.1 are classified into groups that question similar aspects of the developing theory. This classification is arranged according to the categories and dimensions of the theoretical model that has evolved up to this point. The structured

list is presented in Table 5.2. Research argues that by answering to these issues, the ROP model will be advanced and refined.

The research at this stage reflects on the most appropriate data source to inform these issues – considering the delimited researcher environment of the study. At the same time the suitability of theoretical sampling as sampling strategy was also considered.

Research argued that theoretical sampling is justified in continued analysis cycles because the questions asked of developing theory (Table 5.2) are specific and require specific information to advance theory development (this agrees with the conditions to which theoretical sampling is suited). In regard to an appropriate data source in further analysis, it was reasoned that within the delimited *researcher environment*, the input of academic researchers and applicable role players closely related to the *research process* would best inform the research because their responses echo the *researcher environment*.

How data should be collected from the researcher/additional role-players data source posed as a further question. A positive consequence of the compilation of the Table 5.2 issues was that the structuring of issues suggested a framework for a to-be-designed data collection instrument. This made a closed-ended questionnaire a viable data collection solution. Responses of researchers/role-players to closed-ended questionnaire questions in this instance could answer to specific issues. The aspects of appropriate sample, data source and measuring instrument are discussed in more detail in the next section, once the framework of the ROP-issues of Table 5.2 has been explained.

As mentioned, Table 5.2 indicates that the theory advancement issues that require further investigation are structured around the categories and dimensions of already developed theory (Figure 5.2 refers). For example, the first row entry in Table 5.2 lists issues regarding the *research process* category. In this respect, it is reasonable to ask whether a quantitative method can be employed to investigate these aspects of uncertainty; whether the four dimensions of the *research process* can be verified quantitatively; and whether the reliability of quantitative measurements of the *research process* category – as well as the other ROP categories - can be established (this question actually suggests that quantitative data be sampled by means of a closed ended questionnaire). Questions, furthermore, ask whether quantitative data will be able to verify the *research category* as the core category of ROP theory and whether the nature of relational links can be quantitatively explained and new links identified.

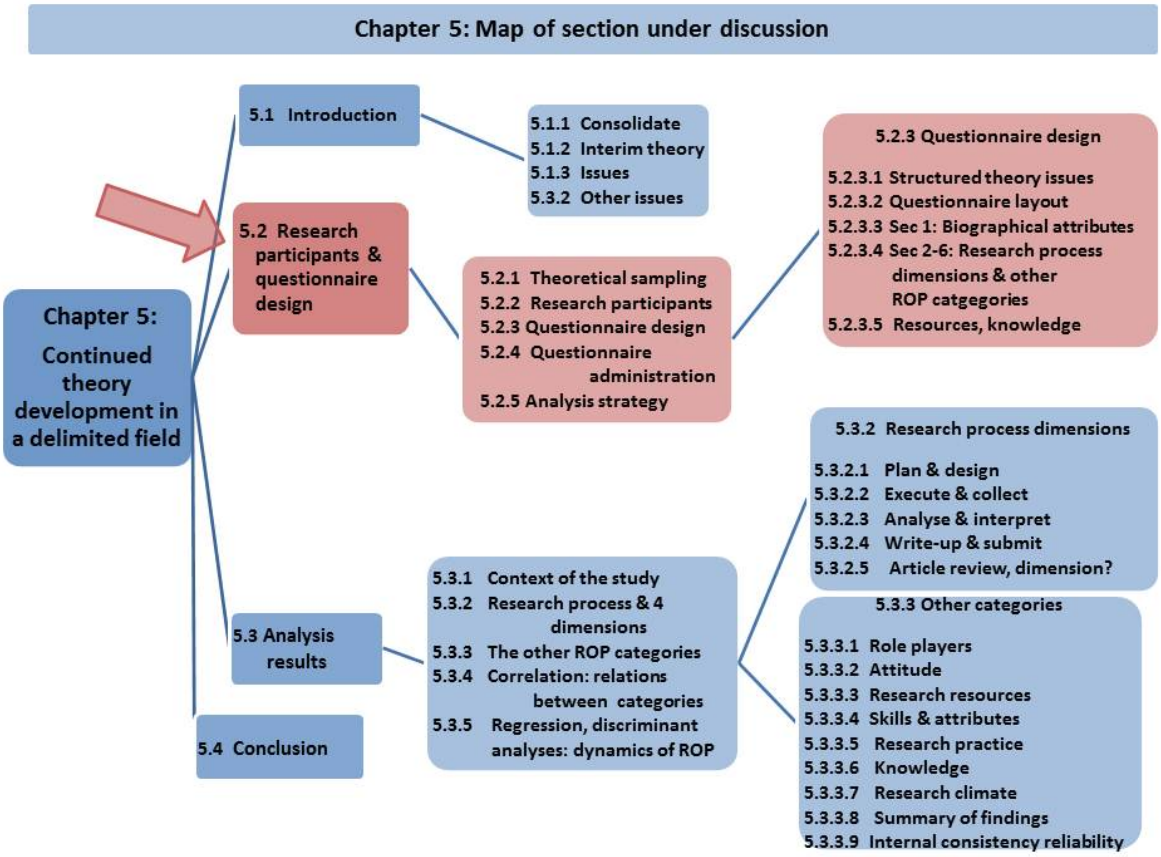
The positive consequence of the structuring of theory development issues therefore suggested a data collection instrument, namely a closed-ended questionnaire to collect data from the academic researcher/role-players data source. The next section will explain, per theory-category, the essence of what the designed questionnaire probed in clarifying the listed issues of the developing ROP theory.

Table 5.2: Issues asked of developing theory

Category	What was asked of developing theory? (the issues listed in Table 5.1)
Research process	• Quantitatively verify that the processes of planning and design, execute & collect; analyse & interpret; write-up and submit form dimensions of the research process category • Quantitatively verify the reliability of the research process construct in ROP • Quantitatively verify the research process as core category of ROP theory (relates to all categories) • Quantitatively determine nature of relational links to other categories • Does the research process presents as a procedural category (certain 'steps' or components?). In other words consists of the steps of plan, execute, analyse and write-up
Plan & design	• Quantitatively verify the reliability of the planning & design dimension-construct of the research process in ROP theory • Is the ethical review process element of the research process(a sub-dimension of the plan & design dimension of the research process)
Execute & collect	• Quantitatively verify the reliability of the execute & collect dimension-construct of the research process in ROP theory
Analyse & interpret	• Quantitatively verify the reliability of the analyse & interpret dimension-construct of the research process in ROP theory
Write-up & submit	• Quantitatively verify the reliability of the write-up & submit dimension-construct of the research process in ROP theory • Should the editorial/ peer review/ publication process be included in the researcher environment?/ In the research process? • Does the peer-review process form sub-dimension of the research process (via the dimension of write-up & submit?) • Verify article submission part of research process category (via write-up & submit dimension)
Research role players	• Quantitatively verify the reliability of the role players construct in ROP theory • Do managers form a dimension of the role players' category? • Role player responsibility: A role player dimension or a research practice dimension? • Team members form a dimension of the role-player category; but 'team-approach to research' forms a property of research practice category?
Attitude towards research	• Quantitatively verify the reliability of the attitude construct in ROP theory • Does a relational link exits between attitude & research resources? • Consider negative attitude/ perception towards research resources/ stats services noted in field notes • Relational link with skills & attributes?
Research resources	• Quantitatively verify the reliability of the resources construct in ROP theory • Are research resource centres a dimension of the research resource category? • Does the research climate category relate to the research resources category? • Does the role-players category relate to the research resources category?
Skills, attributes of researchers	• Quantitatively confirm the reliability of the skills & attributes-construct in ROP theory • Is motivational-mindset an element of the skills & attribute category and motivators (e.g. promotion) an element of the research climate category
Knowledge	• Quantitatively verify the reliability of the knowledge construct in ROP theory • Does a relational link exist between knowledge & role players? • Does the knowledge category relate to the skills and attributes category?
Statistical literacy	• Quantitatively verify the reliability of the statistical literacy dimension- construct of knowledge in ROP theory
Subject-knowledge	• Quantitatively verify the reliability of the subject knowledge dimension-construct of knowledge in ROP theory

Research & publication savvy	• Quantitatively verify the reliability of the research & publication dimension-construct of knowledge in ROP theory

5.2 Research participants and closed-ended questionnaire design



5.2.1 Theoretical sampling and the researcher/ role player data source

Section 5.1.3.2 indicated that questions asked of the ROP model (listed in Table 5.2) - as it had developed in interim analysis cycles - were specific and addressed particular aspects of the developing theoretical model. These conditions justify theoretically sourcing specific information from a data source/s. Therefore the decision was taken that in continued analysis cycles data required to clarify aspect of uncertainty (Table 5.2) would be selectively chosen by mean of theoretical sampling.

5.2.2 Research participants

Within the researcher environment of this study, academic researchers present as an appropriate data source – this was argued in Section 5.1.3.2. The researcher's voice within the *researcher environment* conveys grassroots experience of conducting research, producing research findings and publishing results in academic journals. More specifically, this research argued that academic researchers have research knowledge and experience of the *research process* as well as the process

of submitting and publishing their research. This places academic researchers in a valuable position to supply relevant information on events that include conducting, preparing, submitting and publishing research. It was also reasoned that the statistical vantage point from which this research was undertaken could assist in selecting appropriate academic researchers (with research and publication experience) who would inform theory development: The researcher of this study had worked closely[82] (as research support statistician) with academic researchers on their research projects keeping field notes of all their research projects as well as those of postgraduate students). These field notes reflect the working notes on statistical analysis and research write-up (all academic researchers had published or submitted articles for publication when this study commenced). The notes also provide examples of events noted by the researcher of this study that seemed to impact on how effectively research findings were eventually published. For example, a couple of entries indicate the probable impact of English proficiency in conveying research findings in an article in clear and easily understandable terms - which impacts on article acceptance. A sample of thirty-four academic researchers was selected and approached for participation. Barring three academics, the potential participants were all employed in various Schools of the University of South Africa.

Four consulting statisticians were also included as potential participants. Because of the scarcity of research support statisticians (which also applies to UNISA), the four identified statisticians are respectively employed at the University of Pretoria and Stellenbosch, and two work as private consulting statisticians.

To enable research to develop a measurement of effective research publication in continued analysis cycles it was argued that the identified research participant group should include both experienced and inexperienced researchers (who had all published at least one article in an accredited journal), as well as researchers who seem to publish effectively and those who battle to get their research published. Participants in the data source were subsequently classified as experienced researchers who publish frequently; researchers with substantial experience who either publish effectively or take longer to publish; and researchers with limited experience and who find it difficult to get their research published.

The previous section, Section 5.2.1.2 indicated that the classification of issues that arose from the interim cycles of theory development gave rise to the suggestion of a closed-ended questionnaire as data collection instrument to sample information from the identified academic researcher/role player data source. Section 5.2.2 relates how this open-ended questionnaire was designed to address the listed Table 5.2 issues.

5.2.3 The design of the closed-ended questionnaire

5.2.3.1 The structure of listed theory issues incorporated in the questionnaire design

The issues asked of the interim developed theory (Table 5.2) were incorporated in the design of a closed-ended questionnaire by asking what the essence of concern, per category, of interim

[82] The researcher of this study co-authored at least one research article per project that transpired from these research projects. This researcher was involved in several discussion sessions with the academic researcher of a specific project and was familiar with the statistical-component/ content of the study.

developed theory was, and then using the concern areas to formulate questionnaire questions to inform these issues (Table 5.23 in Appendix 5.1 illustrates the reasoning of Table 5.2 and 5.3 in a combined table).

The second row-entry of Table 5.3, for example, indicates that areas of concern of the *planning and design* dimension of the *research process* - and questions formulated to address these concerns - focus on the evaluation of participants' understanding of what *planning and design* involves (thus evaluating the concept of a *planning and design* step of the *research process*); and evaluation of how important participants perceive the concept of *planning and design* to be when they 'do research'. The understanding is that a researcher conducts research with the aim of publishing research findings in accredited journals.

Formulation of research questions was based on information collected in the literature analysis cycles of this research and the introductory literature review of Section 2.6 of Chapter 2, and concentrated on events relevant to the concern areas. For example, in the *planning and design* phase of research, prior research experience sensitises researchers to the importance of proper planning. The dimensions of the *research process*, namely *planning and design; execution and collection; analysis and interpretation*; and *write-up and submit,* form the framework of the questionnaire. The research argued that all other ROP categories identified in interim developed theory, namely *knowledge, research resources, research climate; role players, research practice; attitude;* and *skills and attributes* impact on and interact with the *research process* in different stages of 'doing research'. In other words they find sedimentation in the research process (for example, the *skills* of researchers to reason logically impact on how effectively research is planned, and the knowledge of existing research in a subject field assists in deciding on an appropriate research area that has not been researched extensively, representing also an aspect of *planning*). Questions and question-formulation regarding issues of the other ROP categories were therefore incorporated in the four dimensions of the research process in the designed questionnaire.

The detail of the layout of the closed-ended questionnaire is discussed in Section 5.2.3.2. However Table 5.3 indicates which questions of the questionnaire are of relevance to the various concern areas.

Comment
In research described in this chapter, the cyclic methodology of the GTM comes to the fore again: not all concerns regarding evolving theory could be anticipated when the closed-ended questionnaire was designed: the information to be collected via the closed-ended questionnaire responses led to insight in addressing listed theory-issues but, in turn, also gave rise to new questions asked of continually evolving theory. Chapter 5 will therefore intermittently list new concerns that arose as insight grew and will indicate how these concerns were continually addressed an analysis cycles. Charmaz (2012: 100) also raises this point when she writes that a grounded theorist cannot, in advance, know precisely which questions to include in a measuring instrument because of the 'evolving nature' of a GT approach.

Table 5.3: Questions in the questionnaire that address issues asked of developing theory

Category	Questionnaire items	What in essence are the concerns of the listed issues (Table 5.2) that the questionnaire questions of the designed questionnaire aim to inform? "These questionnaire statements focus on ……."
Research process	q2.1 – q5.18	….. the importance of the research process to all facets of producing and publishing researchl
Plan & design	q2.1-2.13	…. the importance of researchers' *insight* in planning research (the shared effect of type of research question, questionnaire format, appropriate analyses on quality and effective research); and the importance of *planning as such, logical reasoning, perseverance & social skills*
Execute & collect	q3.1-3.8	….. the importance of researcher knowledge, experience and savvy to aptly & ethically execute research to deliver quality data & research with integrity
Analyse & interpret	q4.3-4.9	…. on the importance of the interplay between statistical knowledge, literacy, statistical resources (software) , logic and statistical reasoning to ensure correct analyses & interpretation
Write-up & submit	q5.1 - 5.10; 5.18; 6.15.5 – 6.15.6	…the importance of research-, statistical-, subject specific knowledge and savvy to integrate research write-up. Successful write-up requires specific skills, acceptance of role-responsibilities & respect for role-players
Research role players	q6.15.8; 6.15.12; 6.15.18; 2.14; 5.11; 5.16	…. on the importance of the responsibility roles of researchers & other role players: responsibility to be/ become knowledgeable, gain experience; & accept specific role responsibilities, e.g. respect for other players
Attitude towards research	q2.16; 2.18; 3.9; 3.10 -3.12; 4.13-4.15; 5.14; 5.15	…. on a lax/ uninformed attitude re the research process (aspects of planning, execution &submission), resources/ services, role player-responsibilities (peer reviewer, statistician, researcher)
Research resources	q6.13.2 6.13.4– 6.13.5 6.13.12	…. the type of statistical services – as a research resource – researchers value to do research & publish successfully
Skills, attributes of researchers	q2.10 – 2.13; 4.7; 5.6	…. on skills & capabilities of the researcher (logical reasoning, communication, stats capabilities, language & writing) in the research process (planning & write-up) to effectively do research & publish
Knowledge	q6.1-q6.18	…. on subject specific knowledge, statistical literacy and experience doing research and publishing article – last two aspects can be regarded as 'savvy'. How important participants perceive knowledge to be.
Statistical literacy	q6.13.3 6.13.6 – 6.13.10	…. aspects of *statistical literacy* needed in components of the research process to effectively conduct research (ability to design questionnaire, report results, interpret stats analysis, contribute & integrate stats with subject knowledge in articles; respond to reviewer critique)
Subject-knowledge	q6.15.9 – 6.15.11; 4.2	…. the importance of subject knowledge; and also on the combination of subject & statistical knowledge in the research process (design-, analysis interpretation-, write-up components) to produce research findings & publish
Research & publication savvy	q6.15.1 – 6.15.6; 6.15.12; 6.15;13; 6.15.16 – 6.15.18	…. on the importance of research- & publication savvy (publication trends, publication requirements of integrity, quality, ethical research); and on the importance of experience of researchers (appropriate techniques for circumstances; execution pitfalls, apt interpretation, 'know' data) to effectively do research

5.2.3.2 The layout of the designed closed-ended questionnaire

The questionnaire was designed as a self-administered questionnaire and consists of six sections with a total of 18 questions (and sets of sub questions). Apart from being designed to address the areas of concern (set out in Table 5.3), the layout of the questionnaire and the type of responses recorded were selected to facilitate quantitative analysis. For example, the responses to question

statements were mostly a choice between five rating level options (Likert rating scale). This type of response ensured that quantitative verification of concern areas could be conducted and that relationships between categories could be quantitatively explained. Some of the questions furthermore consisted of subsets of between 6 and 18 sub question-statements. The purpose of groups of similar-topic statements was to accommodate quantitative verification of the internal consistency reliability of concepts (categories or dimensions). This would ensure that reliable quantitative measurements of components (categories and dimensions) of developing ROP theory were used in further analyses.

The six sections of the questionnaire probe the following:
* Section 1: The biographical attributes of research participants that the introductory literature review of this study suggested could or do, affect the research process and/or the publication of articles (Section 2.6 of Chapter 2).
* Section 2 - 5: These sections were designed to collect data on concern areas arranged according to the four dimensions of the *research process*, namely *planning and designing* research; *executing research and collecting* data; *analysing and interpreting* collected data; and *write-up and submitting* research findings (in the format of articles) to accredited journals. These four sections incorporated questions on issues of other ROP categories as they transpire in specific steps of the research process. The other categories (barring *research resources* and to some extent *knowledge*) were therefore included in the four sections of the *research process* dimensions.
* Section 6: This section probed perceptions of the importance of knowledge, research- and publication savvy, as well as the perceived benefits and needs of academic researchers for a *research resource centre* and *statistical support services*. Because of the statistical research support perspective that this research assumes, perceptions of research participants regarding the impact of research resource centres and research support were included in the questionnaire. Apart from the literature that refers to the benefits and influence of quality support to research, observation by the researcher of this study also suggests that *research resources* (and statistical services as a research resource) benefits the research process and publication of research articles. A further reason for the inclusion of Section 6 of the questionnaire is the fact that this section offers a way of quantitatively verifying the *researcher*-dimension as a true dimension of the *environment* category of this study and therefore a justified delimiter of the substantive area of research.

5.2.3.3 Section 1: Biographical indicators

Section 1 of the questionnaire consists of twelve questions that probe the biographical properties of participants. The attributes probed were based on discussions of biographical attributes that the literature in the initial analysis cycles indicated as influential effects (Chapter 2, Subsections 2.6.2.2. and 2.6.2.3 refer to these studies) The attributes probed include:

- The participants' academic position in their College;
- The stage in their career when the researcher-participants were required to do research;
- The publication year of their first published article;
- Events and factors that participants feel affect their research productivity;
- Prior research experience;
- Teaching and/or research preferences;
- Writing skills;
- English proficiency;

- English first-language speakers;
- Researchers' preference for solo or collaborative research;
- The type of research design researcher-participants prefer to use in their research; and
- Drivers that motivate researchers to publish.

5.2.3.4 Sections 2 to 5: the four dimensions of the research process

As mentioned in Section 5.2.3.1, the questionnaire was structured around the four dimensions of the *research process* (Sections 2 to 5 of the questionnaire) and probed both concern areas linked to a specific dimension of the *research process* and concern areas linked to other categories as they manifest in a dimension of the *research process* (e.g. w*riting skills* are probed in the *write-up and submission* dimension of the *research process* with *writing skills* forming a dimension of the *skills and attributes category* of ROP theory. Please refer to Table 5.3 in this regard).

Sections 2 to 5 consists of subsets of, respectively, 18, 12; 16; 18 Likert rating scale statements evaluated on a five-point importance-rating scale. Importance-rating options include a rating of '1' indicating perceptions of 'no relevance/ or importance'; '2' indicating 'not really important'; '3' indicating 'important'; '4' indicating 'really important' and '5' indicating 'extremely or critically important'.

- Section 2: *Planning and design*

The questionnaire statements of the *planning and design section* focus on the importance of researchers' insight into the planning of research (e.g. the format of a research questionnaire to answer to specific types of research questions, and the link between viable statistical techniques and type of research question to answer); the perceived importance of researcher attributes in *planning* such as logical reasoning, perseverance and communication skills, and role responsibilities of role players in the planning of research. For example, question 2.5 states: 'Statistical principles should be kept in mind when planning research which includes appropriate sampling techniques'. This probes awareness of the fact that adherence to statistical research principles forms part of research planning;

- Section 3: *Execution and data collection*

These questionnaire statements focus on the importance of researchers' *knowledge, experience and savvy* (the *knowledge c*ategory) to aptly and ethically (the *research practice* category) execute research that delivers quality data and reliable research findings. The statements furthermore probe *skills and attitudes* and, *role players'* responsibilities (e.g. responsibilities of team members) during research execution. Question 3.3 for example evaluates participants' perceptions on *research practice* when executing research: 'The trustworthiness of analysis and research findings depend on the quality of collected data'.

- Section 4: *Analysis and interpretation*

These questionnaire statements focus on participants' perception of the importance of the interplay between statistical *knowledge, literacy (knowledge* category)*, statistical resources (*e.g. software*),* logical and statistical reasoning (*skills and attributes* category) and acceptance of responsibility roles (*role players* and *attitude* categories) to ensure appropriate *analysis* of collected data and the

interpretation thereof. Question 4.12 for example states, 'Data analysis may require statistical support (from a statistician) but an attitude of joint responsibility for the interpretation of analysis results should be assumed by researcher and statistician'.

- Section 5: *Write-up and submission of an article.*

This set of 18 statements focuses on the importance of research-, statistical-, subject specific *knowledge* and savvy to integrate research write-up. Successful write-up requires specific *skills*, acceptance of role-responsibilities and respect for role-players (*role players, attitude*, and *research practice*). Question 5.7 for example states: 'the successful transfer of knowledge (in article write-up) is dependent on a researcher's language proficiency'.

As indicated in Sections 5.1.3.2 and 5.2.3.1, the focus of the questionnaire statements originated from the questions asked of the interim developed theory, and the formulation of the questionnaire statements leaned heavily on influential events and attributes mentioned in the literature reported in Chapter 2, Section 2.6. This comment also applies to the description of questionnaire statements of Section 6 of the questionnaire discussed in the next subsection.

5.2.3.5 Section 6: research resources (statistical services) and knowledge

Research resources

Interim analysis results suggest this category to be very relevant to the ROP phenomenon (Table 5.1 and Section 2.6.2.2, Chapter 2). This statement was noted by the researcher of this study in observational notes following statistical support consultation with researchers. Field notes repeatedly indicate the expressed need of researchers for statistical support. Results of the open-ended questionnaire also verify the importance of research support resources (please refer for example to Table 4.32 and Section 4.4.3 of Chapter 4).

Perceptions on issues that involve the *research resources* category are evaluated in subsets of statements questions 13 and 14 of Section 6. These questions focus specifically on *statistical research support* as a *research resource*, but not without the recognition that *research resources* overarch more than purely statistical support. *Research resources,* for example, include funding, laboratories, IT resources, research time, internet connectivity, training opportunities, research administration and more. In this questionnaire some of these resources are probed in sections of the questionnaire (for example t*raining opportunities* to be discussed in the next sub-section on k*nowledge statements)* while other resources were regarded as somewhat less relevant to ROP theory within the delimited researcher environment (for example, IT resources in the researcher environment are regarded as a given: researchers have to have internet connectivity to collaborate and review literature. In assuming IT services as a given, the fact is acknowledged that not all researchers have unlimited access to the internet which is known to impact negatively on research activity).

The first question in Section 6, question 13, probes the type of statistical support participants require while doing research. This is assessed in 12 statements rated on a five-point frequency-of-use Likert rating scale. A rating value of '1' indicates a perception that the type of resource/statistical service is not important or not used by the participant; a rating of '2' signifies a perception that the service is not often used; up to a rating of '5' which indicates an indispensable or constantly used

service. These statements for example query whether researchers require statistical support services on an ad hoc basis only (q6.13.11); for questionnaire design purposes (q6.13.3); for statistical analysis purposes (q6.13.4); throughout the entire research process (q6.13.2) or whether extent of use depends on the type of research undertaken (q6.13.12).

The purpose of the inclusion of the second multiple choice question in Section 6, namely question 14, is to probe the feasibility of a research resource centre as part of the research resources category of ROP theory. This question asks whether participants believe that a research resource centre has the potential to favourably impact the publication of research articles.

The knowledge category of Section 6 of the questionnaire

Question 15 of Section 6 consists of 18 five-point Likert rating scale statements that are once again rated according to importance ratings, where a rating of '1' indicates 'not important at all or irrelevant'; up to '5' that indicates 'critically important'. The questions probe *knowledge* issues of *publication and research* savvy (e.g. question 6.15.2 states: 'Journals increasingly require proof of ethical clearance of the research'); *statistical experience and literacy* (e.g. question 6.15.17, 'The ability to sensibly interpret statistical analysis develops with experience); and *subject specific knowledge* and *development* (e.g. Question 6.15.15, 'Being part of a research team can expose researchers to good research practice'). The next section reports on the implementation, data collection and analysis cycle of the closed-ended questionnaire.

Comment

In retrospect, although the *research practice* category of ROP was touched on in the questionnaire (e.g. q6.15.15), both the *research climate and research practice* categories could have been more specifically probed in the questionnaire. When the questionnaire was designed, issues on these categories were not the most prominent of questions raised about developing theory and therefore the more pressing issues were investigated. This agrees with the afore-mentioned comment by Charmaz (2012: 100) that a grounded theorist cannot, in advance, know precisely which questions to include in a measuring instrument because of the 'evolving nature' of a GT approach. However, the literature of the introductory literature review and initial analysis cycles stress the relevance of these two categories and this research reasoned that the concepts that represent for example, *research climate* - such as *work load, knowledge sharing among colleagues, a research* attitude and atmosphere in a department*, remuneration and incentives*, (the last-mentioned was covered in the motivation in Chapter 1) – were clearly detailed in the literature. The same could be said about the *research practice* category. In retrospect this could be regarded as a limitation of the study but at the same time this also points to a complex and comprehensive additional study field: for example, to quantify the research environment of a specific department would require several measures of the department environment: e.g. the number of academics, the number of actively publishing academics; their publication experience; willingness to mentor younger academics in research; willingness to share knowledge and experience; ability to convey knowledge; and more. This could distract attention from the main concern of the study.

5.2.4 Questionnaire administration, ethical responsibility and clearance, and data capturing

Ethical clearance was obtained from the PARG (Professional Administrative Research Group) Ethical Review Committee of UNISA to conduct the research (2014). The committee also approved a prototype of the questionnaire.

In the introductory letter of the questionnaire (attached with a copy of the questionnaire in Appendix 5.2) the purpose of the research was briefly explained and the necessary contact numbers of both the researcher of this study and her supervisor were included. The cover letter informed participants that participation was voluntary and that a participant could withdraw from the study at any time if he/she so wished. The cover letter indicated that participation was anonymous and that the confidentiality of the participant would be protected at all times. Data will be stored on the researcher's back-up drive for a period of three years after the completion of the study (encrypted) and deleted thereafter. The data will only be used for research purposes. Completion of the questionnaire was regarded as the participant's written consent to partake in the study and was so indicated on the cover letter. (A signed consent form was not attached to the questionnaire as this could be interpreted by participant researchers as a threat to their anonymity and the confidentially of their information).

The questionnaire was administered during June and July of 2014. Prior to questionnaire administration, the researcher contacted each participant personally (telephonically and a week before the distribution of the questionnaire again via a reminder e-mail, Appendix 5.3) to inquire about their willingness to participate. Since the research topic[83] is of concern for all researchers who publish, the academics approached all indicated their willingness to complete the questionnaire.

Copies were e-mailed to all participants who indicated their willingness to complete the questionnaire electronically and the researcher of this study personally delivered and collected hard copies of the questionnaire to participants who preferred a hard copy. The participants completed the questionnaire in their own time but a turnaround time for completion was set at two weeks. Twenty-two completed questionnaires were returned within a week and, except for two questionnaires (which the participants indicated that they chose not to complete), all other questionnaires were returned once a reminder e-mail was posted. In total the responses of thirty-two completed questionnaires could be entered into an EXCEL database.

The response data was electronically captured to an EXCEL spreadsheet and thereafter imported to the 9.4 version the SAS[84] (Statistical Analysis System) analysis platform. All statistical analyses were conducted using this package. In the analysis strategy section that follows, Section 5.2.5, only a general overview of possible analysis technique options is covered to indicate how each technique can be applied to answer to different types of concerns of the evolving theory. The strategy is not broken down into detailed progression steps - as would have been the case in a conventional quantitative description of analyses. The reason for this is that the nature of the GT methodology

[83] Mapping the dynamics of ROP: viewed from the perspective of a research support statistician

[84] SAS version 9.4,(2013). The SAS/STATS User's Guide and platform. Cary, North Carolina: SAS Institute. UNISA upgraded to SAS 9.4 (from 9.3) in December 2014.

sets it apart from conventional approaches: cycles of analysis, interpretation, comparison and questioning are conducted which lead to new insights. The newly acquired insight enriches theory development but may also raise further questions: 'What type of analysis will further enhance insight or clarify uncertainty?' An analysis strategy thus actually unfolds as cycles follow one another. In this study the strategy of results reporting consists of describing a technique as and when implemented in analysis cycles. Evaluation criteria were intermittently applied by asking of the analysis process:

- Are categories verified as relevant and valid ROP categories and do these categories comply with internal consistency reliability?
- Can a definition of what each category stands for be put into words so that these categories do not remain vague conceptualisations?
- Are categories parsimoniously structured?
- What has been gained by analysing data in a specific way? (technique)
- Are dependencies and relational links between categories quantitatively expressed? And do these relationships (expressed in equations) strengthen, verify and elaborate on findings in interim theory development?
- Do the 'category-section' and the 'relational links-section' of the investigation integrate into a theoretical model for ROP?
- Does the research succeed in presenting a theoretical model of ROP?

Set against this line of reasoning, an envisioned analysis strategy is presented in section 5.2.5

5.2.5 An analysis strategy for the data collected from the closed-ended questionnaire

It is foreseen that the following statistical analysis of responses will assist in answering the theory development issues set out in Table 5.2:

- The importance and relevance of the *research process* to ROP:
  The relevance of the *research process* to ROP can be measured against perception scores of the four dimensions of the *research process* category, namely, *plan and design; execute and collect; analyse and interpret; write-up and submit*. These scores can be derived from subsets of participant responses to the closed-ended questionnaire statements. The reliability of these perception scores can be tested (for internal consistency reliability (Hatcher 1994) prior to the magnitude of the scores being interpreted in terms of their relevance (the extent-of-importance rating) to the ROP phenomenon. In addition, the frequency response patterns of statements in a group of statements - that explain a dimension of the *research process* (e.g. *analyse and interpret)* - can further serve to detail *how* important participants perceive every aspect of a dimension of the *research process* to be.
- The relevance of the other categories to the ROP*:*
  Perception scores of the other ROP categories can likewise be derived from participant responses and tested for reliability as well. These include *attitude; skills and attributes; role players; research practice; knowledge (with dimensions of subject specific knowledge; statistical literacy; and research and publication savvy* and *research resources*). The interpretation of the perceived importance of these categories can also be linked to the magnitude of derived perception score values. In addition to the information supplied by perception scores, the

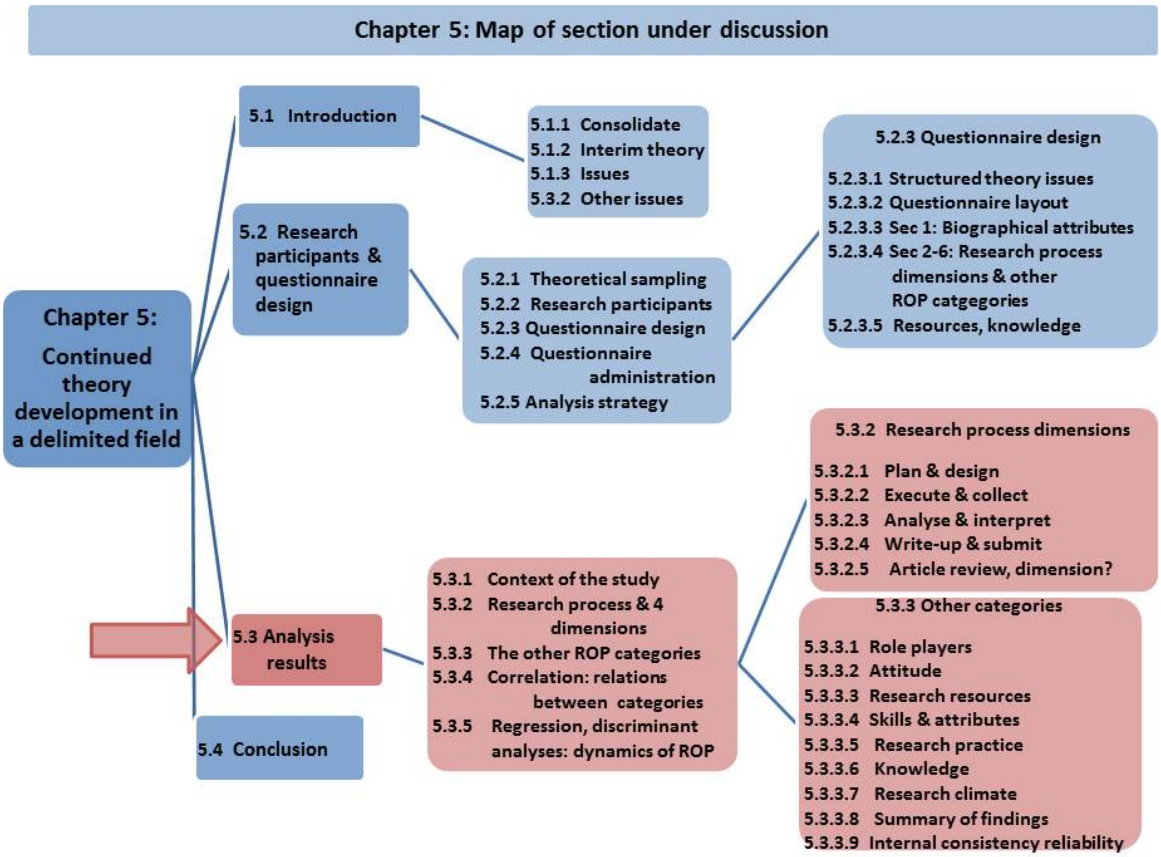
patterns of response rating frequencies for each question in a subset of statements that jointly explain a category (e.g. *attitude)* can assist in detailing how participants perceive every aspect of the particular category evaluated.

These analyses will also be able to address uncertainty linked to specific issues mentioned: for example (a) whether the *role-players* category forms a stand-alone category (initial theory development suggested that *role players* formed a dimension of the *research process*); and, (b) whether *research resource centres* form a dimension of the *research resources* category.

- *The research process category as core category*:
  The property of a core category, namely, that it relates to all or most other categories in the substantive area can be quantitatively verified for the *research process* category. This can be achieved by verifying the statistical significance of pair-wise correlations between the *research process* category (or sub-dimension) and other categories. The pair-wise correlations can be obtained from a correlation matrix calculated on perception scores of the *research process* category (and sub-dimensions) and other ROP categories. Spearman or Pearson correlations can be calculated depending on whether the data is a combination of categorical and continuous data (Spearman) or whether all data are continuous (Pearson) (McDonald 2014).
- *The dynamics of the ROP:*
  *T*he dynamics that underlie the effective publication of research findings (within the delimited researcher environment) can be explained by applying statistical techniques such as cluster analysis, step-wise regression analysis and non-parametric tests to sets of perception scores (SAS Institute 2013, McDonald 2014). In this way specific relationships can be identified and quantitatively described.
- *The type of academic researcher as impacting effect on ROP:*
  The field notes of the researcher of this study suggest that research- and publishing experience of academic researchers affects publication-rate. This suggestion can be quantitatively investigated by means of discriminant analysis (SAS Institute 2013). The technique of discriminant analysis can determine whether categories (or sub-categories) of ROP theory discriminate between different types of academic researchers. Section 5.2.2 indicated that research distinguished between four types of academic researchers, namely experienced researchers who publish frequently; researchers with substantial experience that publish effectively; researchers with substantial experience that take longer to publish; and researchers with limited experience and who find it difficult to get their research published. This probable way of analysing the quantitative data would also raise the further question whether the academic researcher (as author of articles) constitutes a further category – apart from *the role-players* category - or where this effect slots into the ROP theoretical model?
- *A theoretical model for the phenomenon of ROP:*
  The provisional analysis strategy also foresaw that quantitative confirmation of a theoretical model for the dynamics of the ROP (in the delimited researcher environment) could be established by means of multivariable step-wise linear regression (Draper and Smith 1998: 294-311; Freund and Littell 2000: 114-119)

The results of the analysis cycles of the closed-ended questionnaire responses and deductions derived from these analyses are reported in Section 5.3. The results reported will indicate how the analysis techniques listed in this section of viable analysis techniques were implemented.

5.3 Analysis results



Analysis results are presented in four sections that respectively sketch the background of the research: the biographical properties of the participants in Section 5.3.1); the frequency response patterns of the dimensions of the *research process* category (*5.3.2*); and that of the other quantitatively measured ROP categories (Section 5.3.3.); and Section 5.3.4 that reports the relational links between the research process category - as core category of the model - and other ROP categories.

5.3.1 The context of this study: biographical properties of researchers

As mentioned in the description of the research participants, Section 5.2.2, all academic researchers that completed the questionnaire had published at least one article when this research was undertaken (100%). All participants therefore had a measure of research and publication experience and were classified as,

- Expert researchers who publish effectively ($n_1 = 8$);
- Experienced researchers who publish effectively ($n_2 = 6$);
- Experienced researchers who do not publish effectively ($n_3 = 10$) ; and
- Inexperienced researchers who battle to publish ($n_4 = 8$).

One-way frequency tables of the biographical properties of section 1 of the questionnaire describe the academic researchers as follows: Only 4 of 31 (12.90%) academics indicated that they had acquired research experience in positions that they held prior to their appointment in their current

academic positions. Nine of 32 (28.13%) academics wrote articles in their mother tongue (English) and respectively 17 (53.12%); 12 (37.50%) and 3 (9.38%) indicated their English proficiency as excellent, average and poor. The researchers also indicated that respectively 10 (31.25%); 9 (28.12%); and 13 (40.63) preferred to publish either solo; as part of a research team; or either solo/in a research team depending on the nature of the research project. Participants indicated an expected time lag of between 6 to 60 months from research initiation to research findings being published. The mean expected time lag indicated was 21.7 months – testimony that research execution and article publication are perceived to be time consuming.

Of the 32 participants, 30 (93.7%) indicated that they experienced more, and less, productive publication phases in their careers to which they attribute the reasons listed in Table 5.4. If the second to fourth entries in the table, namely reasons of *managerial/ administrative workload; academic workload; and institutional factors* are collectively viewed as *research climate* issues, the percentage responses to *research climate* conditions that impact on ROP is 45.31%. This indicates the influence of a favourable research climate to publication productivity. Likewise, in Table 5.4, the collective percentage of 23.44% for the entries of *lack of research focus; research process issues and research support* suggests the considerable impact of the *research process* and *research resources* on effectively producing and publishing research. These trends agree with the findings of the introductory literature review in Chapter 2 (Sections 2.6.2) and are quantitatively verified in the results discussions of Sections 5.3.2 – 5.3.4 that follows.

Table 5.4 also indicates that of the 72 responses to the multi-choice questionnaire question (q12) on what motivates a researcher to publish, 16 (12.5%) *research-advancement* responses were reported; 20 (27.78%) *departmental or broader career advancement* responses; and 43 (59.72%) *personal acknowledgement and personal satisfaction* options were selected. These results strongly suggest that personal acknowledgement and career advancement form a stronger motivator to execute research and publish findings that does research advancement. Additional open-ended responses to question 12 commented that 'coercion/ promotional-dependency' often formed a driver to publish, as well as monetary or other perks gained by publishing (e.g. *development benefits* such as *international conference attendance).*

Important to notice is the fact that 47% of the research participants indicated that they prefer using qualitative research designs and that only 40.63% indicated preference for quantitative or mixed methods research designs. If the 6.25% of the research participants who indicated they are equally comfortable working with quantitative or qualitative research designs are added to the quantitative/ mixed methods design-group, qualitative-quantitative representativeness is met to an extent. This aspect might prove to impact on analysis results (Please refer to Section 5.3.3.3 for example).

Table 5.4: Frequency distributions of factors perceived to impact ROP and factors that motivate researchers to publish and research design preference

Events researchers perceive as hindrances to article publication (q4)*		What motivates academic researchers to publish? (q12)*	
Events/ factors	**Frequency (%)**	**Events/ factors**	**Frequency (%)**
Personal circumstance	16 (12.50)	Research advancement	9 (12.50)
Managerial/ admin workload	24 (18.75)	Career advancement/ Department	9 (12.50)
Academic workload	23 (17.97)	Broader career advancement	11 (15.28)
Institutional factors/ policy	11 (8.59)	Personal acknowledgement	18 (25.00)
Lack research focus	8 (6.25)	Personal satisfaction	25 (34.72)
Research process issues	9 (7.03)	Total	72 (100.00)
Research support	13 (10.16)	Research design comfortable to use (q1.10)	
Researcher attributes	4 (3.13)	Quantitative research design	4 (12.50%)
Research role players	5 (3.91)	Qualitative research design	15 (46.88%)
Editorial process	15 (11.72)	Mixed methods research design	9 (28.13%)
Total	128 (100.00)	Equally comfortable with qualitative/ quantitative	2 (6.25%)
		Other research designs	2 (6.25%)
* multiple response questions, therefore totals can exceed N of 32			

This discussion therefore describes the background of the research: participants theoretically sampled had varying degrees of research and publication experience; attributed various reasons as obstacles to effective publication; and were motivated to publish for different reasons. The next section describes participants' perceptions of the importance of the *research process* dimensions and the *research process* as such, to the production and publication of research articles.

5.3.2 The *research process* and dimensions of *plan, execute, analyse, write-up*

Interim theory development identified procedural steps of the *research process,* namely the dimensions of *planning and design; execution of research and data collection; analysis of collected data and interpretation of results;* and *write-up and submission.* The next four subsections of Section 5.3.2 explain respondents' perceptions of the importance of these dimensions. Research argues that quantitative measures of relevance would confirm interim theory's suggestion that the *research process* forms the core category of the ROP model. Therefore a level of high importance is expected to be awarded to these dimensions and to the research process as a whole.

Sections 5.3.2.1 – 5.3.2.4 present four composite one-way frequency tables of the response patterns of academic researchers to questionnaire statements that explain each *research process*-dimension. The perceived importance of each dimension - as reflected in the relevant frequency patterns – can then be deduced. This describes how relevant ('important') researchers perceive a specific dimension of the *research process* to be in terms of the production and publication of research findings.

The same format of results reporting is followed to describe the other quantified ROP categories, namely, *research role players* (Section 5.3.3.1); *attitude* towards research (Section 5.3.3.2); *research*

resources (Section 5.3.3.3); *skills and attributes* (Section 5.3.3.4); *research practice* (Section 5.3.3.4); and *knowledge* (Section 5.3.3.6).

5.3.2.1 The planning and design dimension of the research process category

The frequency table below, Table 5.5, presents the frequency-response patterns of the 32 participants to questionnaire statements that probe aspects of the *planning and design* phase of the *research process*. The first column of the table lists the aspects of planning and design of research that were probed; the 2nd to 5th columns report the frequencies (and row percentages) per importance level reported by the academic researchers and the last column indicates the row totals of responses per question statement reported. (The layout of all frequency tables reported in Section 5.3.2 is similar to this description).

The p*lanning and design* dimension was evaluated against concepts that focus on statistical and research principles that underlie the planning of research, e.g. choice of research methodology that includes measuring instrument/s, the target population, sampling and the format and formulation of questionnaire statements to answer to certain types of research questions. *Properties, attitude, knowledge* and *skills* of researchers and role players required to *plan and design* research effectively were also incorporated in these statements.

Interpreting the response pattern/s of participants, Table 5.5

The last row of Table 5.5, the row of total frequencies that reflects participants' general perception of the relevance of the *planning and design* dimension, indicates that the participants overwhelmingly (on at least the 'very important' rating level) indicated that *research planning and design* are essential to doing research (with the aim of publishing research). Of the 352 responses to the 11 questionnaire statements 52.28% responded with a 'very important' rating and 28.13% with a 'critically important' rating, totalling 80.97%. Examination of the individual response patterns of question statements (the individual row entries) revealed that participants tend to attach more value to planning issues that revolve around statistical and research principles (e.g. questions 2.1; 2.6; 2.7; 2.9) than to aspects, that, for example, relate to researcher qualities of communication and social capabilities (e.g. questions 2.11 and 2.12). The attribute of perseverance is however regarded as critically important.

Table 5.5: Questionnaire statements that probe importance-perceptions of the planning and design dimension of the research process[85]

Rating values: 1=irrelevant;2=not really important; 3=important; 4-truly important; 5=critically important					
Aspects of research plan and design	**Perception ratings**				**Total**
Frequency **Row Percentage**	**2**	**3**	**4**	**5**	
2.1 The type of research questions formulated impacts the procedural steps of research execution	1 3.13	4 12.50	5 15.63	22 68.75	32
2.2 The outcome of quality research – and how publishable it is – hinges on sensible planning	2 6.25	3 9.38	10 31.25	17 53.13	32
2.4 Specific statistical principles underlie research execution in quantitative/ m. methods research	1 3.13	8 25.00	13 40.63	10 31.25	32
2.5 Statistical principles should be considered when planning research	1 3.13	3 9.38	10 31.25	18 56.25	32
2.6 The dependency between type of research question & appropriate analysis technique is an important consideration when planning research	1 3.13	5 15.63	7 21.88	19 59.38	32
2.7 The suitability of a measuring-instrument depends on the research question formulated	0 0.00	4 12.50	4 12.50	24 75.00	32
2.9 Valid analysis-technique options available to research depend on the type of questions included in a questionnaire (e.g. Likert rating scale)	0 0.00	5 15.63	8 25.00	19 59.38	32
2.10 The ability to think logically is an important component of research planning	0 0.00	6 18.75	10 31.25	16 50.00	32
2.11 Good social skills facilitate planning deliberations with role players	2 6.25	9 28.13	11 34.38	10 31.25	32
2.12 Communication skills are important when the rationale for planned research actions is discussed with the research team.	1 3.13	7 21.88	15 46.88	9 28.13	32
2.13 Perseverance is a crucial skill in moving research from the planning to publishing phase	0 0.00	4 12.50	6 18.75	22 68.75	32
Total	9 (2.56)	58 (16.48)	99 (28.13)	186 (52.84)	352
[#]: No level 1 ('irrelevant') responses were recorded					

5.3.2.2 The execution and data collection dimension of the research process

Table 5.6 presents the composite one-way frequency table of participant responses to the subset of statements that probe relevance of the *execution and data collection* dimension of the *research process*. The layout of the table is similar to that of the *planning and design* table.

Aspects of *research execution and data collection* probed in the questionnaire focus on how research activities and responsibilities should be conducted to comply with research and statistical principles. For example, how questionnaires should be administered if field workers are co-opted to assist with questionnaire administration; and how data should be captured and data integrity verified. The focus is on the importance of reliable data as a crucial stepping stone towards reliable analyses and quality research reported in published articles.

[85] In initial analysis cycles the *ethical review proc*ess was perceived to be a dimension of a broader "research-related processes category" (with the *research process* and *editorial review* process perceived to be the other two dimensions of the "processes category"). However intermediate analysis cycles indicated that the *ethical review process* should rather be regarded as an element of the *planning, design and formulation* dimension the *research process* since ethical clearance of research projects has become a research-requirement of all UNISA research since 2012.

Interpreting the response patterns of Table 5.6

The last row of total frequencies of Table 5.6 indicates that researchers perceive *research execution* as a critically and highly important dimension of the *research process.* Ninety-two percent of responses to this subset of questions received either *truly important* or *critically important* responses: respondents perceived the *execution and data collection* dimension of the *research process* as very important to the production of research and the eventual publication of research findings.

Table 5.6: Questionnaire statements that probe importance-perceptions of the research execution and data collection dimension of the *research process*

Rating values: 1=irrelevant;2=not really important; 3=important; 4-truly important; 5=critically important					
Aspects of research execute and collect phase	**Perception ratings**				**Total**
Frequency **Row Percentage**	**2**	**3**	**4**	**5**	
3.1 It is good research practice to pilot a measuring instrument prior to administering the final product	0 0.00	4 12.50	8 25.00	20 62.50	32
3.2 R-integrity – which impacts eventual research publication – is compromised if fieldworkers ignore interview guidelines	1 3.13	1 3.13	12 37.50	18 56.25	32
3.3 Trustworthiness of analysis findings depends on the quality of collected data	0 0.00	2 6.25	9 28.13	21 65.63	32
3.4 Coordination of research activities during research execution is crucial to research success	0 0.00	5 15.63	12 37.50	15 46.88	32
3.5 Accurate capturing of participant responses ensures a reliable database	0 0.00	2 6.25	8 25.00	22 68.75	32
3.6 Statisticians regard database verification an integral part of research execution	0 0.00	2 6.25	17 53.13	13 40.63	32
3.8 Proper research execution is ultimately the responsibility of the researcher	0 0.00	1 3.13	12 37.50	19 59.38	32
Total (and percentage of grand total)	1 (0.45)	17 (7.59)	78 (34.82)	128 (57.14)	224
[#]: No 'irrelevant' responses were recorded					

5.3.2.3 The analysis and interpretation dimension of the research process

Participants' perceptions of the importance of the *data analysis and interpretation of results* dimension of the *research process* category were measured against perceptions of how the analysis strategy of the *planning* phase of research is implemented in data analysis and how subject specific knowledge assists in 'translating' analysis results to the language of the research field. It is understood that analysis of data requires a certain level of statistical knowledge and skills from researchers. The statistical knowledge and literacy can reside exclusively with the academic researcher or can be shared/ supported by a statistician. Shared responsibility for the correct interpretation of analysis results is then a concern area of this dimension. This dimension evaluated participants' perceptions of the importance of appropriate techniques, technique assumptions, insight when interpreting analysis results and consequently reliable and trustworthy research findings reported in published and submitted articles.

Interpreting the response pattern/s of Table 5.7

Table 5.7 reports that academic researchers perceive the *analysis and interpretation* dimension of the research process as a very important component of the *research process* to publish research

findings. Seventy nine percent of the total responses (reported in the last row of Table 5.7) to this subset of statements was *truly or critically important* response-replies.

Table 5.7: Questionnaire statements that probe the importance-perceptions of participants of the statistical analysis and results interpretation dimension of the research process on ROP

Rating values: 1=irrelevant;2=not really important; 3=important; 4-truly important; 5=critically important					
Aspects of research analyse and interpret phase	**Perception ratings**				**Total**
Frequency **Row Percentage**	**2**	**3**	**4**	**5**	
4.3 Specific skills are required to apply and interpret text-analysis software packages	1 3.13	4 12.50	8 25.00	19 59.38	32
4.5 The value of good planning is evidenced when the analysis strategy unfolds in sensible reliable results	0 0.00	6 18.75	12 37.50	14 43.75	32
4.6 Correct interpretation of results is dependent on insight in analysis technique	0 0.00	4 12.50	13 40.63	15 46.88	32
4.7 Knowledge of statistical technique assumptions ensure that results are not compromised by adhering to assumptions	0 0.00	5 15.63	13 40.63	14 43.75	32
4.8 The interpretation of results from user-friendly statistical packages still requires a level of statistical literacy	0 0.00	6 18.75	15 46.88	11 34.38	32
4.9 Numerically inclined researchers are not intimidated by the output format of statistical analysis results	3 9.38	11 34.38	10 31.25	8 25.00	32
Total	4 (2.09)	36 (18.75)	71 (36.98)	81 (42.19)	192
[#]: No level 1 ('irrelevant') responses were recorded					

5.3.2.4 The write-up and submit dimension of the research process

The evaluation of research participants' perceptions of the importance of the *write-up and submission* component of the *research process* focused on aspects of writing and language skills; statistical- and subject knowledge insight; research support statisticians' ability to transfer knowledge to the academic researcher; role-players' responsibilities associated with this dimension and publication savvy of academic researchers (Sathian 2013).

Interpreting the response pattern/s of Table 5.8

Academic researchers perceived article *write-up and submission* as a very important component of the *research process:* this is evidenced in the column-totals of the last row of Table 5.8. Approximately 87% of the total responses to this subset of questionnaire statements reported a *truly important* or *critically important* response. This overall perception of the importance of *write-up and submission* of articles is echoed in individual frequency patterns of this component that report an above 66% *critically important* response frequencies, for example q5.4; 5.5; 5.9; 6.15.5 and 6.15.6:

- The statistician's ability to communicate research findings intelligibly to researchers is key to accurately reporting statistical findings in an article;
- The success of an article depends on writing skills of the academic researcher;
- The contribution of all role players in research should be acknowledged;
- Suitable journals should be considered during the write-up phase of research.

However, the level of *importance* indicated by some other questions, for example, q5.8; q5.2; and q5.18 indicated a slightly lesser degree of perceived 'critical importance':

- Joint research team responsibility should be accepted for the accurate reporting of research findings in an article (28.13% *important* vs. 31.25% *critically important* responses);
- The presentation of analysis results in the form of a self-explanatory table rather that a lengthy description (21.66% *important* vs. a 43.75% *critically important* response);
- Co-authorship with research support statisticians who contribute substantially to the research and article write-up[86] (26.67% *important* response vs. a 40% *critically important* response).

Thus, although participants perceived all aspects as important to this dimension of the *research process*, they seem to perceive role-responsibility issues re the statistical aspects of research write-up as slightly less critical that the other listed aspects.

In summary the results of this exploratory section indicate that all four dimensions of the *research process* are perceived as very important to the production of research findings – which in turn affects the publication of research findings. In Sections 5.3.4 and 5.3.5 that discuss analysis results re relational links between and within categories, and the verification of the *research process* as the core category of the theoretical model, the *research process* is incorporated in analyses as an entity and not broken down into its dimensions discussed in the preceding four sub-sections. The argument in this regard is that the four dimensions are all perceived by research participants as essential to the *research process* and all dimensions contribute towards explaining the *research process*. (The last mentioned comment is verified in Subsection 5.3.3.10, still to come). In this way analysis and results reporting can be presented in a more compact format.

The next section, Section 5.3.2.5, explains the positioning of the *article review process* in the delimited researcher field before turning attention to the evaluation of the relevance of the other ROP categories in Section 5.3.3.

[86] Sathian comment (Sept 2013) on statisticians and co-authorship according to the rule of the International Committee of Medical Journal Editors: "Authorship-credit should be based on (i) substantial contributions to conception and design, data acquisition, or analysis and interpretation of data; (ii) drafting of the article or revising it critically for important intellectual content; and (iii) final approval of version to be published. Authors should meet conditions (i) to (iii).

Table 5.8: Question statements that evaluate perceptions of the importance of the write-up and submission component of the research process

Rating values: 1=irrelevant;2=not really important; 3=important; 4-truly important; 5=critically important						
Aspects of research write-up and submission phase	**Perception ratings**					**Total**
Frequency **Row Percentage**	**1**	**2**	**3**	**4**	**5**	
5.1 A well-formulated analysis strategy eases write-up of the analysis description section of an article	0 0.00	0 0.00	6 18.75	10 31.25	16 50.00	32
5.2 A cleverly presented table of statistical results is more informative that a lengthy description in an article	0 0.00	1 3.13	7 21.88	10 31.25	14 43.75	32
5.4 A statistician's ability to communicate analysis results understandably is key to accurate analysis reporting	0 0.00	0 0.00	0 0.00	11 34.38	21 65.63	32
5.5 Writing skills is a crucial component of successful research publication	0 0.00	0 0.00	0 0.00	9 28.13	23 71.88	32
5.6 English proficiency of ESL speakers may impact successful article publication	0 0.00	1 3.13	3 9.38	15 46.88	13 40.63	32
5.8 The responsibility for the accurate reporting of analysis findings resides with the researcher and consulted statistician	0 0.00	1 3.13	9 28.13	12 37.50	10 31.25	32
5.9 It is good research practice to acknowledge the contribution of research team members in submitted articles	0 0.00	0 0.00	3 9.38	6 18.75	23 71.88	32
5.10 Article submission/ re-submission actions should remain the responsibility of the academic researcher to ensure that he/she remains fully informed on article content	0 0.00	1 3.13	2 6.25	15 46.88	14 43.75	32
5.18 Statisticians who contribute substantially to article write-up should be acknowledged as co-authors of articles	0 0.00	0 0.00	8 26.67	10 33.33	12 40.00	30
6.15.5 Analysis results reporting should be done in an easily understandable fashion	0 0.00	0 0.00	0 0.00	12 38.71	19 61.29	31
6.15.6 An appropriate journal for article submission should be considered during article write-up	1 3.23	0 0.00	3 9.68	6 19.35	21 67.74	31
Total	1 (0.29)	4 (1.15)	41 (11.78)	116 (33.33)	186 (53.45)	348

5.3.2.5 The issue of the article review process (a dimension of the research process)

Although the *peer review process of* submitted articles was originally regarded as a dimension of a stand-alone *publishing process* category of ROP, the suitability of such an approach was reconsidered once the research field of this study was delimited to the *researcher environment.* Within the delimited field, the publishing process as such was not directly relevant to the research whereas the *article review process* remained critically important. In the delimited context of this study it was therefore reasoned that t*he peer review process* is inextricably linked to *the article write-up and submission* dimension of the *research process* and should be incorporated as an element of the *research process.* Set against this reasoning, the concept of the peer review process and data events sourced in this respect are briefly discussed in this subsection. It is argued that this process impacts directly on ROP.

The concept of the article peer review process

Article peer review, as it applies to this study, is regarded as a process that ensures the quality of research and also contributes towards continual academic improvement. The purpose of the peer review process is to advance author standing (the academic researcher) as well as institutional research standing. Peer review therefore represents an instrument towards scholarly integrity (Publishing Research Consortium 2008; Ware 2013). However, as the Consortium indicates, the peer review process is often experienced by academic researchers as a process that delays and slows

article publication; a process that is ineffective in ensuring quality; an unreliable process; biased; and often fails to detect misinterpretation of findings and reasoning. Furthermore the literature[87] reports that reviewers sometimes lack the skills and knowledge to review articles and on occasion focus on irrelevant issues; that reviewers review articles for the wrong reasons; and that the secrecy offered by the double blind review process may lead to irresponsibility in judgment on the part of the reviewers (Best and Smith 2005; Publishing Research Consortium 2008: 5). Delay attributed to the review process directly impacts on how effectively research is published. These findings link with the average lag time of 21.7 months that participants in this research (Section 5.3.1) indicated as the expected time-lag between commencement and publication of research. In the report, published by the Publication Research Consortium (2008: 3), an expected turnaround time of 80 days is reported for a first article submission. It is furthermore indicated that 40% of the 50% articles that on average pass the initial review (in other words 80%) pass on condition that articles are adjusted and submitted for a second round of review. This adds an additional 80 days for a second review (given that peer reviewers adhere to due dates). This excludes the time required for authors to attend to critique and re-submit an article and also excludes the additional time authors are required to queue for a specific journal issue to be published. Evidence therefore abounds that research productivity is directly dependent on the review process as an additional influence on effectively publishing research findings in accredited journals.

5.3.3 The frequency response patterns of the other ROP categories

5.3.3.1 The role player category

The role-players concept

For the purpose of the delimited researcher environment, research role players are regarded as academic researchers; research team members (if collaborative research is undertaken); research support statisticians (relevant when quantitative or mixed method research is undertaken); editors and peer reviewers of articles; and managers that facilitate research administration, training opportunities and research resources. Imbedded in this concept are also the role-responsibilities of role players.

Research participants' perceptions of the importance of role-players' impact on the production and publication of research were evaluated against issues that firstly concern role-responsibilities. For example, q.6.15.8 and q6.15.12 of the questionnaire probe the responsibility-role of the academic researcher by stating that (i) a knowledgeable researcher will identify knowledge gaps in his/her research field; and furthermore will (ii) know that the proper synchronisation of research actions can be crucial to the validation of preliminary findings. With regard to the role-responsibilities of peer reviewers of submitted articles, q 5.11 states that peer reviewers should only review articles that fall in their field of expertise[88]. Likewise the role responsibility of research support statisticians was queried in q2.14. The statement probes the support statistician's responsibility to listen and

[87] An international report on peer review was brought out in 200*8: Peer review of scholarly journals: Perspective of the scholarly community – an international study* (Publication Research Consortium 2008:3)

[88] Field notes of this researcher indicate to two example comments by reviewers that reviewed quantitative article submissions while their expertise were more in a qualitative field: "What is this *means and variances* concepts? Define and provide formulae (2013)". "Why is Table 4 included? It serves no purpose (2015)?" (Table 4 reported the regression coefficients of a statistically significant relationship – the crux of the study).

assimilate when academic researchers present their research and explain their needs regarding statistical support.

Interpreting the response patter/s of Table 5.9

Investigation of the last row of the table, the column totals, indicates that a total of 83.69% of the responses to this subset of statements reported either *truly important* or *critically important* responses. This trend is neatly illustrated in question 5.11 with a 90% *truly- and critically important* response rate, and q6.15.8 with a 93.33% *truly- and critically important* response pattern. From these results it is concluded that academic researchers perceive *role-players (*and role responsibilities) as very important to the production and publication of research.

Table 5.9: Questionnaire items that probe perceptions of research role players on ROP

(Rating: 1= irrelevant; 2 = not really important; 3 = important; 4 = truly important; 5 = critically important)					
Aspects of the *role player category*	**Perception ratings**				**Total**
Frequency **Row Percentage**	**2[#]**	**3**	**4**	**5**	
2.14 The team role of a statistician demands of him/ her to be a good listener	0 0.00	5 15.63	10 31.25	17 53.13	32
5.11 Reviewers should only review articles that fall in their field of expertise	0 0.00	3 10.00	14 46.67	13 43.33	30
5.16 The statistician should be recognized (co-authorship) if his/ her contribution to an article was substantial	0 0.00	7 23.33	10 33.33	13 43.34	30
6.15.8 A knowledgeable researcher (subject field) will identify knowledge gaps in his field of research	0 0.00	2 6.67	15 50.00	13 43.33	30
6.15.12 An experienced researcher knows that correct timing of research actions can be crucial in validating preliminary findings	0 0.00	5 16.13	12 38.71	14 45.16	31
6.15.15 Teamwork can expose researchers to good research practice	2 6.45	6 19.35	12 38.71	11 35.48	31
Total	2 (1.09)	28 (15.22)	73 (39.67)	81 (44.02)	184
The probability of (Chi-square statistic being 6.72, under the null hypothesis) = 0.75 (Fisher's exact probability). Chi-square calculated over '3'; '4'; and '5' rating responses. [#]: No "1' ('irrelevant') responses were recorded					

5.3.3.2 The frequency response-patterns of researcher attitude towards research

The concept of attitude towards research

This concept, as understood in the context of this study, was firstly suggested in interim theory development, but also as part of the personal experience of the researcher of this study (field notes, for example, commented that some academic researchers are passionate about their research while others feel it their duty to do research and pass responsibilities on to other research role-players).

The crux of the attitude towards research probed in questionnaire focused on a positive mindset towards research actions: a preference for, and willingness to engage in research; acceptance of role-responsibilities; dedication to complete research; being informed on the subject field; acquisition of research-, statistical- and publication knowledge; a quality end product (article); and respect and a responsibility towards other research role players.

Interpretation of Table 5.10

Before participants' perceptions of the impact or importance of a positive *research attitude* to ROP could be evaluated, the response patterns to three statements, namely 3.9 - 3.11 that had been negatively stated in the questionnaire were inverted to represent positive response patterns (in

other words, frequencies associated with an importance rating of '1' were exchanged with frequencies associated with a rating of '5'; those with a rating of '2' were exchanged with frequencies of a rating of '4'; and frequencies associated with an importance rating of '3' remained at '3'). At the same time the wording of these questionnaire statements was also altered to reflect positive statements. These statements are indicated with '#' in Table 5.10.

With these frequency response patterns reversed, responses to the subset of statements on *attitude* can be uniformly interpreted. Unlike the interpretation of the previous concepts, the general response perception created by the column totals of the last row of Table 5.10 is one of indecision: 41.67% of total responses grouped under at least the category of 'of little importance' or 'disagreement' and 41.09% of the responses grouped under at least the 'agreement' or 'more important' level of the perception scale. This general perception pattern translates to a level of apathy (attitude) or disinterest in the impact of attitude on ROP. The individual response patterns to statements also indicated differences in perceptions regarding the importance of attitude to ROP. The issue is discussed in further analysis. At this stage the provisional deduction can be made that an apparent lack of enthusiasm for research could suggest as a hindrance that impacts on effectively publishing research articles.

Table 5.10: Questionnaire statements re perceived impact of attitude towards research on ROP

(Rating scale: 1= disagree strongly/ irrelevant; 2 = disagree; 3 = undecided/ true/ or important; 4 = agree/ truly important; 5 = strongly agree/ critically important)						
Aspects of the *attitude* category	**Perception ratings**					**Total**
Frequency **Row Percentage**	**1**	**2**	**3**	**4**	**5**	
2.16 When a research team plans research, issues of reliability is a team responsibility	1 3.13	3 9.38	2 6.25	11 34.38	15 46.88	32
2.18 The planning phase of qualitative research is exempt from statistical considerations	5 15.63	13 40.63	6 18.75	4 12.50	4 12.50	32
3.9 Researchers who pilot test a measuring instrument use feedback to refine a measuring instrument (#)	2 6.45	4 12.90	9 29.03	12 38.71	4 12.90	31
3.10 Research execution should follow every detail of the research plan (#)	4 12.50	8 25.00	4 12.50	12 37.50	4 12.50	32
3.11 Flexibility (from the initially planned research strategy) during research execution is not an option (#)	1 3.13	1 3.13	8 25.00	19 59.38	3 9.38	32
3.12 Qualitative research execution is exempt from statistical considerations	2 6.25	13 40.63	9 28.13	5 15.63	3 9.38	32
4.13 Easy access/ use to 'tinned stats packages' renders the role of the statistician obsolete	12 37.50	10 31.25	4 12.50	2 6.25	4 12.50	32
4.14 A researcher's subject specific knowledge places him in the sole position to relate analysis findings to subject field	4 12.90	12 38.71	4 12.90	4 12.90	7 22.58	31
4.15 In mixed, quantitative research the statistician assumes responsibility for accurate reporting of analyses in articles	3 9.38	12 37.50	7 21.88	8 25.00	2 6.25	32
5.14 Authors should attend to all reviewer critique rather than risk chances of not publishing an article	3 9.68	12 38.71	5 16.13	7 22.58	4 12.90	31
5.15 In-depth consideration of reviewer critique need not be undertaken during article re-submission	10 32.26	10 32.26	2 6.45	5 16.13	4 12.90	31
Total	47 (13.51)	98 (28.16)	60 (17.24)	89 (25.57)	54 (15.52)	348
# formulation and rating scores inverted						

5.3.3.3 The frequency response pattern of the research resource category

The concept of research resources

Research resources is understood to include the aspects of research infrastructure (IT resources and support, internet access, networks, time, assistants, exposure to colleagues; research administration); access to knowledge (text books, conferences, further development and training); and support services. In the delimited researcher environment *research support* services also pertain to *research resource centres* and *statistical support* - which includes the vantage point of this research study[89]. To evaluate academic researchers' perceptions of the impact of r*esources* on ROP, this subset of questionnaire statements therefore focused on research resources that inter alia involve statistical support services.

Interpreting the response pattern/s of Table 5.11

The proportion of 'important', 'truly important' and 'critically important' responses (last row in Table 5.11) of total participant responses amounted to 80.80%. This figure indicates that statistical support services were perceived to have an impact on ROP.

'Critically important' and 'truly important' responses amount to 56.40% of the total response frequencies which does not portray an overwhelming expression of need for statistical support. This finding should however be viewed against the context of the participant-composition of the study (please refer to Section 5.3.1, Table 5.4). Approximately 47% of the research participants indicated that they felt more comfortable using qualitative research designs while 40.63% indicated preference for quantitative or mixed method designs (an additional 6.25% can be added to the quantitative/ mixed methods design group that indicated equal preference for quantitative or qualitative work)[90]. Participant composition implies that a substantial proportion of the participants do not necessarily require specialised statistical support in their research endeavours. This might explain the somewhat tapered 'relevance' or 'importance' perception expressed towards the need for research resources and its impact on ROP. This issue is again referred to under 'limitation' in Chapter 6.

[89] Title of the thesis: Mapping the dynamics of research output productivity: viewed from the perspective of a research support statistician

[90] The researcher of this study co-authored at least one article with each of the research participants. Each article included a section of quantitative/ mixed methods research. Although researchers indicated their preference for qualitative research, all research participants had an extent of exposure to quantitative or mixed methods research.

Table 5.11: Questionnaire statements regarding the perceived relevance of research resources

(Rating scale: 1= irrelevant; 2 = not really important; 3 = important; 4 = truly important; 5 = critically important)						
Aspects of the *research resources category*	**Perception ratings**					**Total**
Frequency Row Percentage	**1**	**2**	**3**	**4**	**5**	
6.13.2 Statistical consulting services throughout the entire project is required	4 12.90	4 12.90	4 12.90	9 29.03	10 32.26	31
6.13.4 Statistical services for statistical data analyses is required in a research project	3 9.68	0 0.00	4 12.90	9 29.03	15 48.39	31
6.13.5 Statistical services in the format of a written statistical report on analysis results is required in a research project	4 12.90	4 12.90	8 25.81	5 16.13	10 32.26	31
6.13.12 Statistical services required depends on the type of research undertaken	3 9.38	2 6.25	2 6.25	6 18.75	19 59.38	32
Total	14 (11.20)	10 (8.00)	18 (14.40)	29 (23.20)	54 (43.20)	125
Frequency Missing = 3						

5.3.3.4 The frequency response pattern/s of the skills and attributes category

The concept of skills and attributes of academic researchers

S*kills and attributes* of researchers are understood to include skills, competencies and properties that enable researchers to conduct research (Evans 2011:20). It is understood that these competencies and characteristics may be either inherent to the researcher or acquired. For example, skills may include reasoning skills, such as deductive, analytic-, problem solving-, statistical reasoning skills (Chance 2002); numeracy (Gibbs 2010); writing- and presentation skills; social skills (Millen 2010); competencies (e.g. ability to put subject specific knowledge, publication experience, statistical knowledge into practice in the research environment; ability to coordinate research); and attributes (disciplined, motivated, focused, systematic, communicate information understandably, English first language speaker, inquisitive nature, innovative, sound work habits, (Bland, Center, Finstad, Risbey and Staples 2005)[91]. The subset of questionnaire statements in this regard focused on logical thinking, communication and social skills, perseverance, English proficiency and research insight.

Interpreting the response patterns of Table 5.12

In Table 5.12 the total 'truly important' and 'critically important' responses of all responses (the last row of the table) indicate that 80.22% of the participants perceive *skills and attributes* of researchers as very relevant to ROP. For example the 69% 'critically important' frequency rating of the *perseverance* of a researcher (q2.13) strongly suggests perseverance to be a critical skill. The individual response patterns indicate that participants view the more tangible or basic research skills and attributes as slightly more relevant (perseverance (q2.13), ability to apply practical knowledge (q4.7), English proficiency (q5.6), logical thinking (q2.10)) than the less tangible skills (social- (q2.11), communication skills (q2.12)).

[91] Bland et al (2005) for example distinguishes between research-socialisation skills, research-driven properties, competencies re subject knowledge, research knowledge, statistical knowledge, work habits and the property of autonomy to do research

Table 5.12: Questionnaire items that probe the relevance of the skills and attributes of researchers on ROP

(Rating scale: 1= irrelevant; 2 = not really important; 3 = important; 4 = truly important; 5 = critically important)					
Aspects of the *skills and attributes category*	**Perception ratings**				**Total**
Frequency **Row Percentage**	**2[#]**	**3**	**4**	**5**	
2.10 The ability to think logically is an important component of research planning	0 0.00	6 18.75	10 31.25	16 50.00	32
2.11 Good social skills facilitate planning deliberations with role players	2 6.25	9 28.13	11 34.38	10 31.25	32
2.12 Communication skills are important when the rationale for planned research actions is discussed with the research team.	1 3.13	7 21.88	15 46.88	9 28.13	32
2.13 Perseverance is a crucial skill in moving research from the planning to publishing phase	0 0.00	4 12.50	6 18.75	22 68.75	32
4.7 Knowledge of stats technique- assumptions ensure uncompromised results when assumptions are complied with	1 3.13	4 12.50	16 50.00	11 34.38	32
5.6 English proficiency of ESL speakers may impact successful article publication 6.6 Successful article: English proficiency ESL speaker	1 3.13	3 9.38	15 46.88	13 40.63	32
Total	5 (2.60)	33 (17.19)	73 (38.03)	81 (42.19)	192
[#]: No level 1 ('irrelevant') responses were recorded					

5.3.3.5 The concept of the research practice category: not quantitatively measured

The concept of research practice

As theory on ROP emerged, the researcher of this study became aware of the distinction between the *process of research* - that is, the phases or steps or processes (Bukvova 2009) that all research endeavours follow - and the individualised or unique way in which each researcher practises or conducts his/her research (Drennan, Politis, Hyde and Clark 2012:1-2).

In this sense the concept of *research practice*, as understood in this research, refers to approaches researchers use to work through the procedures of the *research process*: collaborative or solo research approaches; research networks; social networks; co-authorship and co-authorship networks (Abassi and Altman 2011); involvement in mentorship programs (Cohen et al 2012); team work and team research approaches; quality in research and data (Gelman 2013); abiding to ethical standard of institutional policy and ethical committees (Altman 1994); making use of research support services and research support centres; and a culture of learning, to mention but a few approaches.

The distinction between *process and practice* only became obvious to this researcher in the advanced cycles of analysis, and, although the closed-ended questionnaire was structured around the steps or procedures of the *research process,* the *individualistic practice* of working through the *research process* was only occasionally touched on in the questionnaire (e.g. the use of support services and feasibility of research resource centres q6.13 and q6.14 of the questionnaire). However the literature emphasises the importance of *research practices* and the impact of *research practice* on research output. An informative discussion in this regard is given by Abassi and Altman (2011: 1, 9-13). Their study for example found a statistically significant correlation between collaboration (co-authorship networks) and research performance or productivity.

Therefore, although advanced analysis cycles indicated that *research practice* impacts on ROP, this category was not adequately evaluated in the questionnaire to measure this category quantitatively (this aspect is again mentioned in the limitations section of Chapter 6). The deduction could thus be drawn that *research practice* is relevant to ROP and should be considered – albeit not quantitatively – in the final model of the dynamics of ROP.

5.3.3.6 Knowledge: response patterns of formal and experienced knowledge

In the advanced cycles of analysis, insight in theory development suggested that a number of initial concepts that relate to knowledge and the 'how to' of doing research actually resort under a central concept of *knowledge*. It was reasoned that *subject knowledge*, *statistical knowledge* (statistical literacy, Bolton 2010), research-methodology knowledge (*research savvy or experience,* Altman 1994; Aksnes 2012:6), experience in research (Jung 2012:3); and knowledge on how to prepare, write and submit research to academic journals (*publication savvy,* Jung 2012:3) all collectively represent a knowledge-tool essential to conducting research. It was furthermore argued that knowledge in this sense consists of two components, namely, *formal knowledge* (acquired via study, self-enrichment, etc.) and *experienced knowledge* (gained in the process of doing research, writing articles, working in a research team, mentoring, etc.). This development is in agreement with GT methodology that states that progress in GT theory-development is characterised by a reduction in the number of categories included in the refined/ eventual theoretical model. This insight that the knowledge components fit into a single *knowledge* category therefore confirmed theory progression towards the formulation of a parsimonious model of ROP.

This deduction also simplified advanced regression analysis discussed in Section 5.3.5.1: multicollinearity (inter-dependency) between explanatory variables affects the reliability of regression analysis, something this research would like to avoid. Because multicollinearity was detected between the *knowledge* components, this effect could be counteracted (section 5.3.5.1, regression analysis) by uniting the knowledge dimensions into a single general *knowledge measure*/category in advanced regression analysis (please refer to Section 5.3.5.1). In the current section, however (presenting exploratory findings of participants' perceptions of the relevance of *knowledge* to the production of research findings and publication thereof) the two *knowledge* components of *formal and experienced knowledge* are presented separately.

Formal knowledge: the concept of subject-specific knowledge

Subject specific knowledge is understood to be the knowledge base of the research field that distinguishes the academic researcher as an expert in his/her research field. Such knowledge assumes insight into the theory/ies that underlie the research field and knowledge of current trends or movements in the field (Bolton 2010). A solid background allows the academic researcher to identify knowledge gaps in the subject field and provides insight to effectively plan, design and execute research in such areas.

Formal knowledge: the concept of statistical literacy/ or statistical knowledge

To the researcher, statistical literacy "is as much about understanding how and why numbers are produced and used and the words around these numbers, as the numbers themselves" (Bolton 2010). In other words knowledge of the principles that specific statistical techniques are based upon; their applicability and appropriateness to specific circumstances; what the techniques aim to measure; and how findings are interpreted; (with or without statistical support) are important. The statistical knowledge of researchers need not necessarily include in-depth knowledge of the technical details as such but an understanding of the statistical principles and when techniques are applicable in a researcher's subject field are critical (Altman 1994). For example, entries in the field notes of the researcher of this study refer to numerous instances where the level of academic researchers' statistical knowledge proved a hindrance to the effective publication of articles (because of analysis-interpretation misunderstandings).

Interpreting the response patterns of the subject-specific knowledge sub-dimension, Table 5.13

In the totals row for subject specific knowledge in Table 5.13 the 'truly important' and 'critically important' responses account for 82.26% of the total responses reported for the *subject-specific knowledge* set of questionnaire statements. Respondents place a high premium on the essential role of *subject specific knowledge* to successfully execute research and publish articles. The 69% 'critically important' reaction to the statement that statistical analysis is a specialised field (q4.2) indicates awareness of the importance of sound statistical procedures to quality research reporting (which furthermore indicates the interrelated nature of subject-specific and statistical literacy, which is discussed in the next paragraph). The same deduction can be made regarding responses to statement 6.15.11 which states that subject-knowledge coupled with statistical insight ensures that analysis results are contextually linked to the subject-specific research field: 86.67% 'truly-' and 'critically important' responses confirm the importance of subject and statistical insight to eventual research-output success.

Interpreting the response pattern of the statistical literacy component of Table 5.13

A total of only 40.11% 'truly important' and 'critically important' responses were reported for the *statistical literacy* component of *formal knowledge* (Table 5.13) compared to the total of 42.24% 'irrelevant' and 'not really important' responses for this component. This trend suggests a sense of apathy towards the concept of statistical literacy (this is indicated in the literature as well, refer to Altman (1994) for example). This trend was also recorded in field notes by the researcher of this study while editing the statistical sections of academic researchers' article write-up: the experience that if the academic researcher had deeper statistical insight, write-up would be more effective. The experience is reported in field notes that a support statistician cannot devote unlimited time to article editing. Abassi and Altman (2011), for example, with reference to the reviewing of submitted articles state that deeper insight into statistics remains a problem and that the shortage of statisticians to support the reviewing of articles is "like firefighting": the support statisticians cannot keep up with demand and that the problem remains a deeper statistical knowledge of academic researcher. The seeming apathy could also be ascribed to the fact that, as mentioned previously, only 10 of the 32 respondents indicated that they prefer to do quantitative or mixed methods research.

Table 5.13: Questionnaire statements that evaluate the relevance of the *statistical literacy* and *subject specific* knowledge components of *formal knowledge* of researchers on ROP

(Rating scale: 1= irrelevant; 2 = not really important; 3 = important; 4 = truly important; 5 = critically important)						
Aspects of :	**Perception ratings**					**Tot**
Frequency **Row Percentage**	**1**	**2**	**3**	**4**	**5**	
***Statistical literacy* sub-dimension of the *formal knowledge* dimension of the *knowledge* category**						
6.13.3 Statistical services for questionnaire design is required in a research project	4 12.50	5 15.63	10 31.25	7 21.88	6 18.75	32
6.13.6 Statistical services required in research projects include a description of the analysis strategy to incorporate in submitted articles	3 9.68	5 16.13	5 16.13	11 35.48	7 22.58	31
6.13.7 Statistical services required in research projects include editing of the analysis sections of to-be-submitted articles	4 12.90	7 22.58	5 16.13	7 22.58	8 25.81	31
6.13.8 Statistical services required in research includes willingness (of statistician) to co-author research articles with statistical content	9 28.13	4 12.50	8 25.00	3 9.38	8 25.00	32
6.13.9 Statistical services required in research includes statistical services to submit articles	11 35.48	7 22.58	3 9.68	5 16.13	5 16.13	31
6.13.10 Require stats services to respond reviewer feedback , resubmit article	7 23.33	13 43.33	2 6.67	5 16.67	3 10.00	30
Total rating frequencies for statistical literacy question statements	38 (20.31)	41 (21.93)	33 (17.65)	38 (20.32)	37 (19.79)	187
***Subject specific knowledge* sub-dimension of the *formal knowledge* dimension of the *knowledge* category**						
6.15.9 Questionnaire design should be based on theoretical constructs of the subject field	0 0.00	1 3.23	8 25.81	8 25.81	14 45.16	31
6.15.10 Sensible interpretation of analysis results requires a subject specific knowledge base	0 0.00	0 0.00	5 16.13	13 41.94	13 41.94	31
6.15.11 Subject knowledge coupled with statistical insight ensure that analysis results are contextually linked to the subject-specific research field	0 0.00	0 0.00	4 13.33	15 50.00	11 36.67	30
4.2 Stats analysis is a specialised field which requires specific expertise	0 0.00	0 0.00	4 12.50	6 18.75	22 68.75	32
Total rating frequencies for subject specific question statements	0 0.00	1 (0.80)	21 (16.94)	42 (33.87)	60 (48.39)	124
Total	38 (12.22)	42 (13.50)	54 (17.36)	80 (25.73)	97 (31.19)	311

Experienced knowledge: the concept of research experience or savvy

Research experience and the research 'savvy' of academic researchers in the context of this study are perceived to be the background knowledge of research methodology that enables the researcher to effectively approach his/her research: the knowledge that research designs, sample size, correct sampling procedures, data verification, formulation of the research problem as research questions and hypotheses, verification of data quality, principles of measuring instruments, ethical research, and more, all form stepping stones to ensure that reliable research findings contribute towards research development in its published format.

Experienced knowledge: the concept of publication savvy of academic researchers

Similar to the concept of research savvy, publication savvy is seen as the necessary background knowledge of requirements, article layout, guidelines, submissions processes, journal interest and focus, ethical research issues and more that qualifies a submission to a journal as eye-catching and potentially of interest to the journal. The way reviewers critique should also be addressed as well as how electronic submission/re-submission procedures function. Together, these are understood to describe publication experience.

Interpreting the response patterns of research experience of experienced knowledge Table 5.14

The total of 'truly important' and 'critically important' responses to the subset of statements that probe academic researchers' perceptions of the importance of research savvy to successfully producing and publishing research amount to 86.56% of the total responses to these statements. This suggests that academic researchers perceive research experience as a critical knowledge component to effectively publishing articles.

Interpreting the response patterns of the publication savvy-component of knowledge (Table 5.14)

The total number of 'truly important' and 'critically important' responses to the statements that probe publication savvy accounts for 81.60% of participant responses. This strongly suggests the viewpoint of participants that knowledge of the publication and submission process impacts on effective ROP. For example, the 74% 'critically important' responses to q6.15.4 regarding the importance of research integrity to editors (and reviewers); and the 61% 'critically important' responses to q6.15.5 regarding the importance of an easily understandable reporting style of authors highlight this deduction.

Table 5.14: Questionnaire items that probe perceptions on the impact of experience (research- and publication savvy) on ROP

(Rating scale: 1= irrelevant; 2 = not really important; 3 = important; 4 = truly important; 5 = critically important)						
Aspects of :	**Perception ratings**					**Total**
Frequency **Row Percentage**	**1**	**2**	**3**	**4**	**5**	
***Publication savvy as* sub-dimension of the experienced *knowledge* dimension of the *knowledge* category**						
6.15.1 The demand for quantitative or mixed methods research article submissions is steadily increasing	1 3.23	2 6.45	9 29.03	12 38.71	7 22.58	31
6.15.2 Journals increasingly require proof of ethical clearance with article submissions	0 0.00	0 0.00	9 28.13	13 40.63	10 31.25	32
6.15.4 Submitted articles should illustrate research integrity	0 0.00	0 0.00	2 6.45	6 19.35	23 74.19	31
6.15.5 Reporting analysis results should be done in an easily understandable way	0 0.00	0 0.00	0 0.00	12 38.71	19 61.29	31
Total rating frequencies for publication savvy question statements	1 (0.80)	2 (1.60)	20 (16.00)	43 (34.40)	59 (47.20)	125

Table 5.14 (continued) **Questionnaire items that probe perceptions on the impact of experience (research- and publication savvy) on ROP** (Rating scale: 1= irrelevant; 2 = not really important; 3 = important; 4 = truly important; 5 = critically important)						
Aspects of :	**Perception ratings**					**Total**
Frequency **Row Percentage**	**1**	**2**	**3**	**4**	**5**	
***Research experience/ savvy sub-dimension of* the experienced dimension of the *knowledge* category**						
6.15.12 An experienced researcher know that correct timing of research actions can be crucial in validating preliminary findings	0 0.00	0 0.00	5 16.13	12 38.71	14 45.16	31
6.15.13 Research experience sensitizes researchers to that specific analysis techniques address certain types of research questions	0 0.00	0 0.00	4 12.90	13 41.94	14 45.16	31
6.15.16 Research experience creates awareness of research execution pitfalls that can compromise research integrity	0 0.00	0 0.00	3 9.68	15 48.39	13 41.94	31
6.15.17 The ability to sensibly interpret statistical analyses develops with experience	0 0.00	0 0.00	6 18.75	16 50.00	10 31.25	32
6.15.18 Experienced researchers are quick to notice interesting trends in their data	0 0.00	0 0.00	3 9.68	16 51.61	12 38.71	31
Total rating frequencies for the research experience question statements	0 (0.00)	0 (0.00)	21 (13.46)	72 (46.16)	63 (40.38)	156
Total	1 (0.36)	2 (0.72)	41 (14.58)	115 (40.93)	122 (43.41)	281

5.3.3.7 The research climate category: not quantitatively measured

The concept of a research climate category

In the initial and interim cycles of theory development certain concepts stood out markedly as relevant to ROP. These include, for example, concepts of the *research process;* k*nowledge base of researchers; research resources*; *research role players; skills and attributes;* and *attitude of researchers*. Certain data events sourced in early analysis cycles were initially understood to fall under these categories: for example, a supportive environment was seen as either a less obvious component of role players (colleagues, managers) or research resources (managers ensuring favourable conditions). However, as analysis cycles continued particular data events on occasion did not seem to fit comfortably in the interim model. In the advanced analysis cycles the need for an additional category to accommodate these concepts became obvious. Such data events for example include, mention of a departmental research culture; an institutional research culture; departmental research orientation and preference; appointment of excellent researchers to stimulate research and research passion; departmental subscription to journals that promote, encourage and inform on research excellence; the role-model impact of excellent researcher-colleagues; and the supportive role and attitude of colleagues who excel in research (the *attitude* category concerns the attitude of the researcher towards research but how a passionate attitude towards research in academic colleagues can inspire researchers to excel does not seem to fit with the identified *attitude category)*. Further examples include time allowed for research; workload; incentives to do research; promotion; teaching load, and the like. These events are emphasised in the literature as events that collectively impact on how effective researchers publish their research findings (Buchheit, Collins and Collins 2001; Jung 2012; Ryan and Hurley 2007; Bland et al 2006; Bland, Center, Finstad, Risbey, Staples 2005). In this regard, Jung (2012:4) refers to Bland and Ruffin (1992) who list similar data events that collectively describe a research-favourable milieu:

> … research emphasis, distinctive [research] culture, positive group climate, assertive participative governance, frequent communication, accessible resources, sufficient size [staff capacity], age and diversity of the research group, appropriate rewards, concentration and recruitment and selection [research excellence], leadership with research experience, and skills…..

All of these data events explain a favourable working environment - labelled *research climate* in this study - an environment conducive to research and the delivery of research output.

Therefore, although these events were recognised as important to ROP throughout the initial and interim analysis cycles, the emergence of a stand-alone category developed in the more advanced cycles of analysis[92]. The category of *research climate* was therefore brought into consideration in the final formulation of the theoretical model of ROP (discussed in Chapter 6) but was not quantitatively evaluated.

5.3.3.8 Summary of the findings of the exploratory frequency distributions of the ROP categories

Table 5.15 summarises the findings derived from the frequency distributions that quantitatively evaluated participant perceptions of the relevance of specific categories to ROP. This discussion was a move towards quantitatively verifying these categories as authentic components of a theoretical model of the ROP. The crux of these findings being the suggestion that these concepts are of relevance to ROP (this excludes the categories of *research climate* and *research practice,* which were not quantitatively evaluated but verified by means of additional literature and field notes of this researcher).

The next subsection, Section 5.3.3.9 moves a step further by validating measures (still to be derived in the following sections) as reliable perception measures of these categories. This is achieved by validating the internal consistency reliability of the quantified categories (Section 5.3.3.9). The subsequent Sections 5.3.4 and 5.3.5 then verify the *research process* category as a core category of theory development; and with the aid of further analysis describes the nature of the dynamics that underlie ROP theory.

[92] This is a characteristic of GT methodology (Charmaz 2012).

Table 5.15: Summary of main findings of the quantitative evaluation of the ROP categories

Category/ dimension	Main finding/s
Research process	• The research process category represents a process (sequential steps) with dimensions or steps of planning and design; execution and collection; analyses and interpretation; and write-up and submission • The *ethical review process* can be incorporated in the initial *planning, design and formulation* dimension of the *research process* • In the delimited researcher field, the *article review* process is incorporated in the *write-up and submission* step of the *research process* • In further analyses*, the research process* is incorporated as an entity in further analyses *(the research process* steps are not individually analysed further*)*
Plan & design	• Participants overwhelmingly (on at least the 'very important' rating level) indicated that *research planning and design* is an essential step when conducting research (with the aim of publishing research) • Academic researchers seem to attach more value to planning issue that revolve around statistical and research principles (e.g. questions 2.1; 2.6; 2.7; 2.9) than what they attach to e.g., researcher *qualities of communication and social capabilities*
Execute and collect	• Academic researcher perceive proper means of research execution and data collection as important to research and successful delivery of research output
Analyse and interpret	• Academic researchers recognize the importance of the appropriate *analyses and interpretation* to the research process and ROP
Write-up and submit	• Participants perceived the *write-up and submission* of research to impact ROP and attach more value to particular write-up aspects than to other
Role players	• Results suggest that participants perceive the research role player category, and particularly the role responsibilities of role-players are relevant to the ROP phenomenon
Attitude of researchers	• A level of apathy towards research is suggested by the response patterns of participants • Could this be that the concept is not properly evaluated in the question statements? Or a max 46% of respondents that prefer to do quantitative/ or mixed method research?
Research resources	• Statistical support services, a dimension of the *research resources category*, is perceived to impact ROP • Response patterns did not seem to portray an overwhelming expression of need for statistical support. Only 34.48% of participants prefer using either quantitative of mixed methods research design approaches.
Skills and attributes	• Research participants perceive the *skills and attributes* of researchers as very relevant to ROP. • Participants perceived the more practical research skills somewhat more relevant than the less tangible social skills.
Research practice	• The category was verified as relevant to the ROP via the literature since this category only crystallised as a standalone category towards the advanced cycles of analyses. (Only evolved in advanced analysis cycles when distinction between procedural research process steps and individualised research practice emerged).
Knowledge	• Formal knowledge: (i) Subject specific knowledge: place a high premium on the essential role of subject specific knowledge to successfully publication of articles. (ii) Statistical literacy: a sense of apathy towards the concept of statistical literacy. • Experienced knowledge: both research and publication experience or savvy was perceived as important to successfully conducting research and publishing findings.
Research climate	• Literature indicates the research climate category as very relevant to effectively publishing research. (This category also emerged towards the more advanced cycles of analysis and was therefore not quantitatively evaluated).
Article review process	• For the purpose of the delimited researcher environment the article review process is incorporated in the write-up and submission step of the research process.

5.3.3.9 Reliable perception measures: verifying internal consistency reliability

Apart from the initial exploratory evaluation – and positive suggestions of participants' perceptions of the relevance of the emerged categories to ROP - the purpose of the quantification of the ROP categories was first and foremost to create reliable measures (per participant) of perceived

relevance of each category to ROP (these measures could then be used in further analyses to describe relationships between the categories).

A form of reliability, referred to as internal consistency reliability, measures whether all questionnaire items designed to describe a category all truly contribute towards category description. Once internal consistency reliability is established, research can proceed by calculating a measure for the particular category for each participant. The measure – referred to as perceptions scores - measures how relevant each participant perceives the particular category to be to ROP. Perception scores per participant are calculated as the mean response ratings for a particular subset of question statements (that describes a ROP category). Internal consistency reliability is confirmed for a particular category if the Cronbach alpha coefficient - derived from the subset of questionnaire responses designed to describe the category - is in the region of 0.7, or exceeds 0.7. (The maximum value a Cronbach alpha coefficient can assume is 1.0). If internal consistency reliability is confirmed, calculated scores can then be used in further statistical analysis to determine and describe the nature of relationships between categories (the relationships that GT methodology refers to as theoretical code).

Table 5.16 presents the results of the respective scale reliability tests performed on the subsets of rating responses to questionnaire statements that describe ROP categories or dimensions. These include: *research planning and design; research execution and data collection; statistical analysis and interpretation of analysis; write-up and submission of analysis results and findings; the research process as an entity; research role player; research resources; skills and competencies of researchers; attitude of researchers ; knowledge as an entity*, with dimensions of formal knowledge (*subject specific knowledge and statistical literacy)*; and experienced knowledge (*research- and publication savvy)*; and *research practice*. The subsets of questionnaire items and the numbers of items that describe each concept are indicated in columns 2 and 3 of the table; the standardised Cronbach alpha coefficient calculated for each concept (column 5) as well as the mean and standard deviation of the calculated concept-scores are reported in last two columns of the table. The column with the heading 'rating values inverted' lists questionnaire statements that were negatively worded in the questionnaire and, whose rating values – according to scale reliability testing protocol - were inverted. (For example, the responses to question 3.9: 'Some researchers skip pilot testing because they do not value the contribution that pilot feedback can have on refining the final measuring instrument', were inverted – rating responses of '1' were inverted to '5'; '2' to '4' and '3' remained as '3'). In compliance with scale reliability test-assumptions, the subset of statements that describe a single category should all be worded in either in a negative or positive way (a uniform rating convention) to ensure a reliable scale reliability test.

The standardised Cronbach alpha values reported in Table 5.16 all exceed the value of 0.7, which verifies the internal consistency reliability of the subsets of responses to questionnaire statements that describe ROP categories or dimensions. With internal consistency reliability verified, perception measures of each category/dimension can be calculated for each participant (the mean response rating for a subset of responses for each participant). The overall mean score for each category is reported in Table 5.16. The question might well be asked how these overall score means should be interpreted. The interpretation of the various scores (and overall score means) link directly to the rating scale of the questionnaire: a value of '1' indicates 'of no relevance/ or importance'; '2'

signifies 'not really important/ or relevant'; … and '5' signifies ', of critical importance of extremely relevant'.

Table 5.16 reports that the overall score means for all quantified categories approximate the value of 4 or exceed 4.0 - with the exception of *attitude,* with a mean score of 2.89; and *statistical literacy,* with a mean score of 3.17. These mean values validate the suggestion of the exploratory analysis of perceptions of 'very relevant' or 'critically relevant' to ROP. With regards to the overall score means for *statistical literacy* and *attitude,* the results once again validate the suggestions of the exploratory findings (Section 5.3.3.2 and 5.3.3.6). Possible explanations for the somewhat 'tapered' perceptions of the importance of *researchers' attitude towards research* and *the requirement of statistical literacy* when conducting research and article write-up were discussed in Sections 5.3.3.2 and 5.3.3.6. Participants who indicated that they prefer qualitative research designs formed a substantial proportion of the theoretically sampled participants. These researchers do not lean as heavily on statistical analysis and insight as quantitative researchers do – which could lower the average perception of the need for *statistical insight and knowledge (statistical literacy)*. It could also be attributed to a neglect of this specialised field by academic researchers who are first and foremost focused on their field of interest (Altman 1994). The low *attitude* score mean can also be attributed to misperceptions regarding role responsibilities of *role players* in the research process. The last-mentioned statement also corroborates the observations of this researcher. A field note of December 2012 on an Education research study, for example, remarks that, "an attitude of passing the responsibility for accurate data capturing to the statistician was observed – 'your problem to hunt for the correct responses if data is not accurately captured' from the questionnaires".

To conclude this subsection, it can be stated that reliable perceptions measures of the relevance of various categories to ROP could be verified. Although 16 concepts (including ROP categories and their dimensions) are reported in Table 5.16 below, only perceptions measures of categories as entities are included in advanced analysis discussed in the following three sections, namely the sets of perceptions scores for

- *the research process as an entity;*
- *knowledge as an entity;*
- *attitude;*
- *skills and attributes;*
- *research resources;*
- *and role-players.*

In this way a parsimonious model of the dynamics of ROP can be derived[93]. The next section, Section 5.3.4 describes how correlations, calculated between these sets of perception scores, assisted in describing relationships between categories and in verifying the *research process* category as core category of ROP theory.

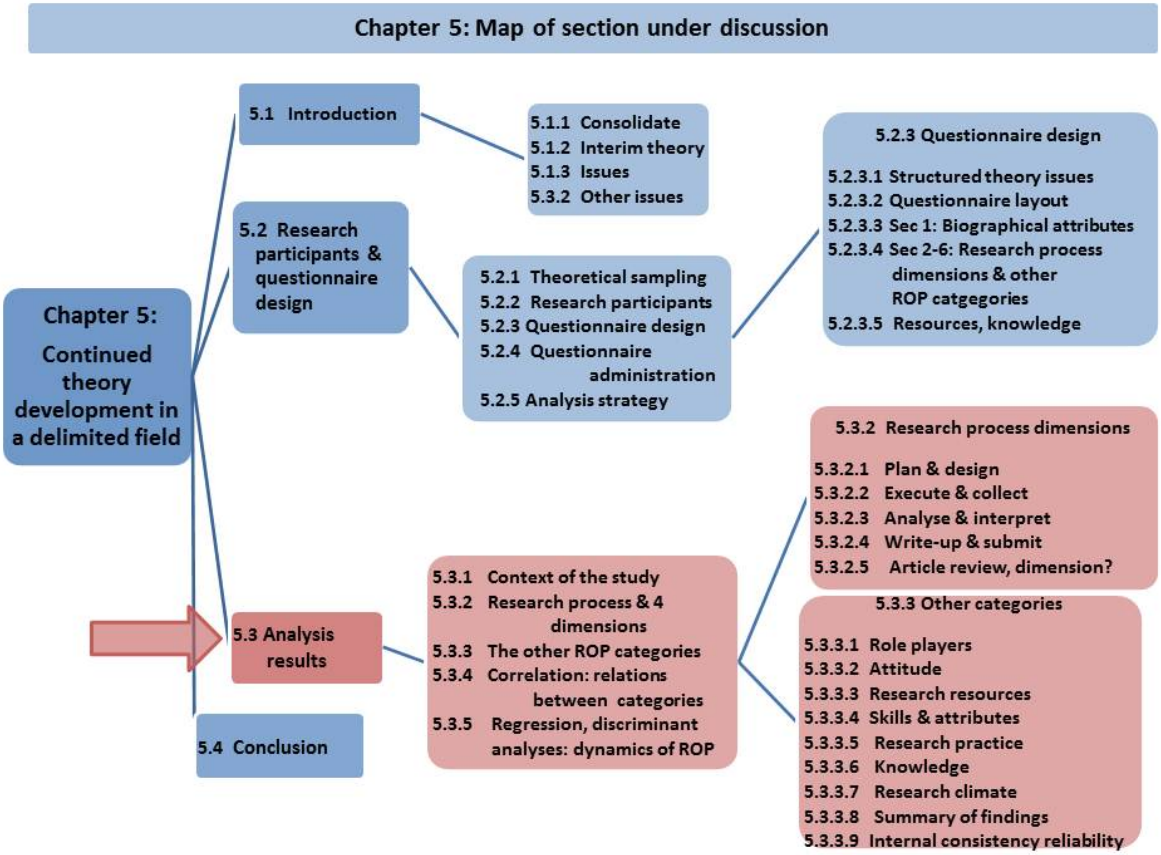
[93] Statistical significant correlation between the four dimensions of the *research process*; and statistically significant correlation between the dimensions of the *knowledge* category would introduce multicollinearity into a multivariable regression analysis (Section 5.3.5) to counteract multicollinearity a single (unified) *research process* measure and a single *knowledge* measure were used.

Table 5.16: Results of scale reliability tests performed on subsets of question-statement responses to verify internal consistency reliability of concepts describing ROP categories and dimensions

concepts	No. of items	Question statement included	Rating scales inverted	Cronbach alpha (stds)	Mean score	Std dev. [&]
Research process	32	2.1-2.2; 2.4-2.7; 2.9-2.13; 3.1-3.6; 3.8; 4.3; 4.5-4.9; 5.1; 5.4-5.6; 5.8-5.10; 5.18	-	0.92	4.34	0.40
- Plan & design	11	2.1; 2.2; 2.4 - 2.7; 2.9 - 2.13	-	0.91	4.31	0.59
- Execute & collect	7	3.1-3.6; 3.8	-	0.83	4.48	0.48
- Analyse & interpret	6	4.3; 4.5-4.9	-	0.85	4.19	0.59
- Write-up & submit	11	5.1-5.2; 5.4-5.6 5.8-5.10; 5.18; 6.15.5 6.15.6	-	0.76	4.39	4.39 0.38
Attitude	13	2.16; 2.18; 3.9n; 3.10n; 3.11n; 3.12; 4.13-4.15; 5.14-5.15	4.9n– 4.11n	0.76	2.97	0.58
Knowledge	18	6.15.12 – 6.15.13 6.15.16 – 6.15.18 6.13.3 6.13.6 – 6.13.10 6.15.9 – 6.15.11 4.2 6.15.1 6.15.2 6.15.4 6.15.55	-	0.89	3.86	0.52
(i) Formal knowledge	11	6.13.3 6.13.6 – 6.13.10; 6.15.9 – 6.15.11; 4.2	-	0.82	3.51	0.72
- Subject specific	4	6.15.9-6.15.11; 4.2	-	0.83	4.29	0.61
- Statistical literacy	7	6.13.3; 6.13.6-6.13.10; 6.15.11	-	0.83	3.17	0.94
(ii) Experienced knowledge	9	6.15.12 – 6.15.13; 6.15.16 – 6.15.18; 6.15.1; 6.15.2; 6.15.4; 6.15.5;	-	0.86	4.24	0.49
- Research literacy	5	6.15.12 – 6.15.13; 6.15.16 – 6.15.18;	-	0.87	4.26	0.56
- Publication savvy	4	6.15.1 – 6.15.2; 6.15.4 – 6.15.5;	-	0.71	4.23	0.57
Role players	6	2.14; 5.11; 5.16; 6; 6.15.8; 6.15.12; 6.15.15;	-	0.79	4.25	0.51
Skills	6	2.10 – 2.13; 3.7; 5.6;	-	0.83	4.20	0.59
Research resources	4	6.13.2; 6.13.4 – 6.13.5; 6.13.12;	-	0.84	3.80	1.10

[&] Std dev.: standard deviation; stds: standardised

5.3.4 Correlations: quantitative verification of relational links between categories (theoretical code)



Once reliable perception measures for categories and dimensions were verified (Table 5.16), the research could focus on the verification and further explanation of relational links suggested in initial and interim analysis cycles (literature review database; open-ended questionnaire database; researcher field notes).

It should be noted that in the more advanced cycles of analysis discussed in Sections 5.3.4 and 5.3.5, the sequence of cycles of analysis technique application was motivated by new information, derived from analysis cycles, that raises further questions regarding the newly acquired knowledge, and this, in turn, is again addressed by a follow-up round of statistical analysis leading to possibly new information and new questions, etc. This type of approach coalesces with the cyclical GT methodology of collection, analysis and comparison. In these advanced analysis cycles several correlation matrices (Section 5.3.4) were calculated; step-wise linear regressions undertaken; and cluster- and discriminant analysis techniques conducted and considered for their relevance to theory development (Section 5.3.5). Illustrative examples of 'new' questions[94] that arose ask:

- Given the four dimensions of the *research process*, do these dimensions interact with one another or do they form independent dimensions of the *research process*? In other words, does interdependency justify representing the *research process* concept by a single inclusive category

[94] These questions are again raised and addressed as they arise in the various analysis cycles.

and will inter-dependency introduce multicollinearity into a regression model (still to be discussed in Section 5.3.5) if the four dimensions are included separately in such a model rather than representing the research process by a single inclusive entity?

- Given that the *research process* presents as a category, can it be quantitatively verified that the *research process* forms the core category of ROP theory in the delimited research environment? (This was strongly suggested in the literature review, open-ended questionnaire and field notes data sources). Section 5.3.4 refers.
- Given that the *research process category* presents as the core category, what is the nature of the relationships to the other categories? This translates to refinement of theoretical code (detailed in section 5.3.4.and 5.3.5).
- Section 5.3.1 indicates that the participant group can be classified into more and less experienced researchers that publish their findings more readily or who struggle to publish their research in accredited journals. The question arose whether the type of research participant (type of academic researcher) should be seen as a new additional category of ROP or merely as a relationship or theoretical code-description (Section 5.3.5). Should academic researchers form part of the *role-players'* category or should academic researchers been regarded as a separate category with different role responsibilities? How should the different influences of the academic researchers and the other role players be accommodated in the ROP model?
- Given that the type of researcher/role player contributes towards ROP theory development, how do the different types of researchers perceive the *research process*? And how do researchers perceive the importance of *knowledge, skills, research resources and attitude*? (This is addressed by means of discriminant analysis in Section 5.4.5).
- How does the eventual model accommodate categories that were not quantified? (e.g. r*esearch practice* and *research climate*).

The examples above serve to illustrate the argument which was used to decide on further analysis techniques to answer questions as they arose. For example, to answer the questions in the first and second bullets regarding the research process category as core category and the inter-dependency of research process dimensions, the first cycle of analysis investigated - via Spearman or Pearson's correlation coefficients – whether inter-dependencies between the dimensions of categories exist (the *research category* and the *knowledge* category, section 5.3.4.1 and 5.3.4.2), and in which way the *research process* category correlates with other categories (Section 5.3.4.3). Subsequent analysis cycles in turn used alternative analysis techniques to address other of the bulleted questions listed above (e.g. discriminant analysis and step wise linear regression).

5.3.4.1 The research process as an entity: Verifying interdependency between research process dimensions

To answer the question of the interdependencies between the four dimensions of the *research process,* Table 5.17 reports the partial Pearson correlation coefficients between the four dimensions of *planning and design; research execution and data collection; analysis and interpretation*; and *write-up and submission* of research, and the *research process* category as an entity. Pearson correlation coefficients were calculated for pair-wise sets of *research process dimension s*cores (discussed in Section 5.3.3.9). The first entries in the body of Table 5.17 report the respective pair-wise correlation coefficients while the second entry in each cell reports the statistical significance of

the particular correlation coefficient being statistically significantly greater than zero if the null hypothesis of no dependency between the respective two dimensions (e.g. 'planning' and 'execution') is true[95].

If interdependency between the four dimensions is considered Table 5.17 verifies statistically significant interdependency between three of the four *research process* dimensions of *planning, execution and analyse* on at least the 5% significance level and with the *write-up* dimension on the 10% level of significance (except for the *analyse* and *write-up* correlation which is not significant). This verifies interdependency between the four dimensions.

If interdependency between the four dimensions and the *research process* as entity is however considered – to justify the use of the *research process* category as entity in further analysis - the correlations of the dimensions with the *research process* category as entity are reported as respectively 0.91, 0.72, 0.72 and 0.53 on the 0.1% level of significance. It is therefore justified to integrate the four dimensions of the *research process* in a single *research process* concept in further analysis cycles. The *research process* as entity embodies the process that overarches the four interacting dimensions. Table 5.15 thus verifies and strengthens the suggestions of interim findings of other data sources (literature and open-ended questionnaire source) that the *research process* category consists of dimensions of *planning, execution, analysis and write-up*. The positive correlation coefficients further confirm that the underlying interaction effect is positive (additional theoretical code): e.g. good planning impacts positively on execution; in turn, proper research execution positively impacts on analysis of data because a properly planning phase will make provision for an analysis strategy and thence to the writing up of quality analysis on reliable data.

Table 5.17: Pearson Correlation Coefficients, calculated on the perception scores for the concepts of *research planning & design; execution & data collection; analysis and interpretation; write-up and submit; and the research process*

N = 32 and significance levels for coefficients indicated as, Probability > |r| under H0: Rho=0					
Correlation Prob (H_0: Rh=0)	**Plan**	**Execute**	**Analyse**	**Write**	**research process**
Plan	1.00000	0.56633 0.0007	0.57504 0.0006	0.32214 0.0722	0.91221 <.0001
Execute	0.56633 0.0007	1.00000	0.37844 0.0327	0.29360 0.1029	0.72413 <.0001
Analyse	0.57504 0.0006	0.37844 0.0327	1.00000	0.19751 0.2786	0.72437 <.0001
Write	0.32214 0.0722	0.29360 0.1029	0.19751 0.2786	1.00000	0.53243 0.0017
Research process	0.91221 <.0001	0.72413 <.0001	0.72437 <.0001	0.53243 0.0017	1.00000

5.3.4.2 The knowledge category as entity: verifying interdependency between knowledge dimensions and sub-dimensions

Similar to the reasoning followed in subsection 5.3.4.1, Table 5.18 below verifies the positive and significant interdependencies between the *knowledge* sub-dimensions of *subject specific knowledge, statistical literacy, publication savvy and research experience*: the statistical significance – on at least

[95] No dependency between two variables is indicated by a correlation coefficient of zero.

the 1% level - associated with Pearson's correlation coefficients between *research experience, publication experience* and *subject knowledge* verifies the interdependencies between these three *knowledge* dimensions; as well as the statistical significance (10% significance level) of the dependency between *statistical literacy* and *subject specific knowledge.* Furthermore, the statistically significant positive correlations (on the 0.1% significance level) of the four *knowledge* sub-dimensions, with *knowledge as an entity*, verifies earlier suggestions of the initial and interim analysis cycles that the category of *knowledge* embraces the dimensions of *formal* and *experienced* knowledge, with respective sub-dimensions of *subject specific knowledge* and *statistical literacy*, and *publication savvy* and *research experience.*

Results indicate that *statistical literacy* is not highly correlated with the other knowledge sub-dimensions (although on the 10% level with *subject specific knowledge*) but is strongly and statistically significantly correlated with the *knowledge as entity* category (r = 0.81541; prob. <.0001, under null hypothesis of no dependency). Although *statistical literacy* represents a form of knowledge, the independence from the sub-dimensions of *publication savvy* and *research experience* demonstrates that this *knowledge* dimension describes a distinctly different kind of knowledge form *experienced knowledge.* The relatively weak correlation with *subject specific* knowledge may indicate that *subject knowledge* does not necessarily imply *statistical knowledge*. This dimension (*statistical literacy*) is also unique in the sense that it implies different levels of knowledge to different research interest groups. For example, delMas (2006) draws a distinction between statistical literacy, statistical reasoning and statistical thinking. The same argument is expressed by various sources in the literature, for example, the ARTIST webpage of the University Minnesota (2014) to name but one source.

Table 5.18: Pearson Correlation Coefficients calculated on the perception scores (pair-wise) for the categories of *subject specific knowledge, statistical literacy, publication savvy and research experience/ savvy.*

N = 32 and significance levels for coefficients indicated as, Probability > |r| under H0: Rho=0					
	Formal knowledge		Experienced knowledge		
Correlation Prob (H_0: Rh=0)	Subject specific knowledge	Statistical literacy	Publication savvy	Research experience	Knowledge as entity
Subject specific knowledge	1.00000	0.28951 0.1040	0.43949 0.0118	0.81883 <.0001	0.71492 <.0001
Statistical literacy	0.28951 0.1040	1.00000	0.25865 0.1529	0.20551 0.2592	0.81541 <.0001
Publication savvy	0.43949 0.0118	0.25865 0.1529	1.00000	0.51005 0.0029	0.62366 0.0001
Research savvy/ experience	0.81883 <.0001	0.20551 0.2592	0.51005 0.0029	1.00000	0.68617 <.0001
Knowledge as entity	0.71492 <.0001	0.81541 <.0001	0.62366 0.0001	0.68617 <.0001	1.00000

5.3.4.3 Quantitative verification of the research process as core category

The question of whether the *research process* category can be quantitatively verified as the core category of the ROP model is addressed in Table 5.19 which reports Pearson's correlation coefficients calculated on the pair-wise sets of perceptions scores of the *research process* (as entity) and respectively the categories of *knowledge; research resources; attitude; role players;* and *skills and attributes*. A distinguishing feature of the core category of a GT model is the fact that the core

category relates to all or most other categories. In the present study, this would imply that the *research process* category[96] relates to all or most of the identified ROP categories. Table 5.19 below therefore assists in this verification by indicating the statistically significant dependencies between the *research process* category and the categories of *attitude* (r = 0.30; 10% significance level); *role-players'* category (r= 0.64; 0.1% significance level); *skills and attributes category* (r = 0.78; 0.1% significance level); and *the knowledge category* (r = 0.65; 0.1% significance level). Although Pearson's correlation coefficient for dependency between the *research resources and research process* categories (r = 0.18) is not indicated as statistically significant, the calculated partial correlation between the *research process* and *research resources* is indicated as statistically significant (partial r = -0.42; 5% significance level) if controlled for the effect of the *knowledge* category. In other words, if the effect of *knowledge* (which shows a strong relationship with the research process, r = 0.65; 0.1% significance level) is removed from the model, *research resources as a category* statistically and significantly relates to the *research process*. The reason for this phenomenon is the strong relationship between *the research process* and the *knowledge category* that overshadows or masks the relationships between the *research process* and *the research resources* category.

Statistically significant dependencies could thus be established between the perceptions scores of the *research process category* and, respectively, the perception scores of the other quantitatively measured ROP categories. This finding quantitatively confirms the status of the *research process* category as the core category of the ROP theory.

The question might well be asked how dependencies can be verified between the *research process* category and, respectively, the two categories of *research practice and research climate* that were not quantitatively assessed in the questionnaire. As motivated in the questionnaire design section these two categories only emerged as independent conceptualisations in the more advanced cycles of analysis once the closed ended questionnaire had already been administered. As indicated by Charmaz (2012), and previously mentioned, gradual theory development is characteristic of GT methodology. However, studies in the literature (an additional data source in this study) – attests to the importance and impact of these two categories on research publication and the research process (Tongai 2013; Schemm 2013; Schulze 2008:629650-651; Bell, Hill and Lehming 2007; Dannapfel, Peolsson and Nilsen 2013; LSE Public Policy Group 2011).

This section therefore concludes that the *research process* constitutes the core category of ROP as suggested by the interim analysis cycles and confirmed in the advanced analysis cycles.

[96] This has been strongly suggested in the initial and interim analysis cycles.

Table 5.19: Pearson's correlation coefficients, calculated on the perception scores for the *research process category and scores of respectively the categories of attitude, role-players; research resources; skills and attributes and knowledge*

N = 32. Significance levels for coefficients indicated as: probability > |r| under H_0: Rho = 0						
Correlation Prob (H_0: Rh=0)	**Attitude**	**Role-Players**	**Research Resources**	**Skills**	**Knowledge**	**Research process**
Attitude	1.00000	0.16766 0.3590	-0.06065 0.7416	0.33484 0.0610	0.13602 0.4579	0.30335 0.0915
Role-Players	0.16766 0.3590	1.00000	0.08913 0.6276	0.64338 <0.0001	0.57657 0.0006	0.64448 <.0001
Research Resources	-0.06065 0.7416	0.08913 0.6276	1.00000	0.06469 0.7250	0.64821 <.0001	0.17763 0.3307
Skills	0.33484 0.0610	0.64338 <0.0001	0.06469 0.7250	1.00000	0.50237 0.0034	0.78016 <.0001
Knowledge	0.13602 0.4579	0.57657 0.0006	0.64821 <.0001	0.50237 0.0034	1.00000	0.64604 <0.0001
Research process	0.30335 0.0915	0.64448 <.0001	0.17763 0.3307	0.78016 <.0001	0.64604 <0.0001	1.00000

5.3.5 ROP dynamics: detailing relationships using step-wise regression and discriminant analysis

The issue discussed in this section argues and demonstrates that verification of the *research process* as core category[97] enables the research – by means of additional analysis - to detail the nature of the relationship between the core category and other quantitatively measured ROP categories. As a starting point, the research argued that the *research process* as core category allowed the research to view the *research process* a dependent variable (the set of *research process perception scores)* when detailing relationships. It was argued that a multivariable linear regression that includes the other quantified ROP categories (the other relevant sets of perception scores) as explanatory variables in a regression model, could describe the simultaneous effect of these categories on the *research process.* In this way the relationship between the core category (the research process) and the other ROP categories (*attitude; skills and attributes; knowledge; research resources and role-players*) can be derived.

Inclusion of an additional exploratory effect in the regression model: researcher type

Section 5.3.1 reported on a classification of research participants into four researcher-groups based on research and publication experience. The motivation for this classification was that the literature (Levin and Stephan 1992; Hanson et al 2010; Shin and Cummings 2010; Jung 2012; White et al 2012) as well as personal observation of this researcher (field notes of consultation sessions) suggested that experience - both research and publication experience - impacts on how effectively academic researchers publish their research. Since this suggested trend links closely to the interest of this study, namely why some researchers publish more effectively than others, the inclusion of an effect in the regression model that represents research and publication experience seemed a promising avenue to investigate. The effect of researcher-type was therefore incorporated (as a categorical variable) in the step-wise regression analysis and discriminant analysis discussed in Sections 5.3.5.1 and 5.3.5.2.

[97] In other words the research process category relates to all other categories - either directly or indirectly.

5.3.5.1 Stepwise regression: joint effect of the ROP categories on the core category

Suitability of measurement scale of explanatory variables in a multivariable regression

To investigate the nature of the joint impact of the quantified ROP categories and the additional effect of the type-of-academic-researcher on the *research process* (and thus on the production and publication of research that flow from the research process), the appropriateness of the measurement scale of these variables was considered to ensure that measurement scale complies with data-type requirements of multivariable regression analysis[98]. This research argues that the sets of perception scores calculated for the ROP categories of the *research process; research role-players; attitude; research resources; skills and attributes;* and *knowledge* represent continuous variables because the relevant scores were calculated per participant as the mean rating responses to subsets of questionnaire statement responses. Continuous variables are appropriate for step-wise linear regression[99].

A next consideration was the data-type of the type-of-academic-researcher that was considered for inclusion in the step-wise regression model. As indicated in Section 5.3.3.1, a distinction could be made between academic researchers based on their research and publication experience, namely:

- Expert researchers who publish effectively ($n_1 = 8$);
- Experienced researchers who publish effectively ($n_2 = 6$);
- Experienced researchers who do not publish effectively ($n_3 = 10$) ;
- and Inexperienced researchers who battle to publish ($n_4 = 8$).

This classification renders the type-of-researcher variable, a categorical variable. Categorical explanatory variables are acceptable in multivariable regression analysis (SAS Institute 1999:3010). The effect of *researcher-type* was therefore incorporated in the regression model as a classification variable.

The measurement scale of the variables therefore complied with the requirement for parametric multivariable step-wise linear regression analysis. In addition, further parametric assumptions of the regression technique also had to be considered[100]. These conditions were checked in the analyses to ensure that they were met in this research.

Purpose of the step-wise linear regression analysis

With the variables for the regression model defined, stepwise regression (forward and backward selection) was conducted. The five sets of perception scores for *role players, knowledge, attitude, skills and attributes,* and *research resources* were entered as explanatory variables in the regression model with the set of *research process* scores as dependent variable. The effect of researcher-type was incorporated as an additional explanatory classification variable. The purpose of the regression

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[98] A multivariable or multiple linear regression model would take the form

$$(2)\ y = \alpha + x_1\beta_1 + x_2\beta_2 + \ldots + x_k\beta_k + \varepsilon,$$

where y is a continuous dependent variable and x_1, x_2, …, x_k are the predictors (explanatory variables) in the multivariable model (Hidalgo and Goodman 2013: 39-40).

[99] A form of multivariable regression

[100] The assumptions for parametric linear regression concern the normality of residuals and the homogeneity of group variances

analysis was to detail the relationship between the core category (*research process*), other ROP categories and the type of researcher that conducts research. This analysis served to quantitatively describe the dynamic interaction between the *research process* and the measurable components of the ROP theory.

Explaining and interpreting the results of the regression analysis, Table 5.20

The results of the stepwise linear regression[101] (the forward selection method) are reported in Table 5.20 which summarises five steps of the forward selection method. Each row of the table reports on a sequential step of the analysis. Each row indicates which independent variable was entered into the model at any particular stage (indicated as the β_1 to β_5 columns of Table 5.20. The table also reports the F value and statistical significance of each consecutive model (column 2); the R-square value (proportion of the variance in the data declared by the model) in column 3; Mallow's Cp value for fit of the model (column 4); and the estimated parameters of each consecutive model (columns 5-10). These parameters describe the dynamic interaction of the ROP categories and the type-of-researcher effect with the *research process* variable.

Row four of Table 5.20 reports the best fit for the *research process* regression model with 74% of the variance in the data declared by the categories of *skills and attributes; knowledge;* and the researcher-type classification variable. The model is statistically highly significant on the 0.1% level of significance. (Multicollinearity was counteracted by not including the variables of *role-players and research resources* which are statistically significantly correlated with the *knowledge* variable*,* and to a lesser extent with *skills and attributes* variable). It can therefore be concluded that *skills and attributes*; *knowledge;* and *researcher-*type directly impact on the *research process* and consequently research output.

[101] Stepwise linear regression is a method of regressing multiple variables while simultaneously removing those that are not important. Stepwise regression essentially repeats multiple regression a number of times, each time removing the weakest correlated variable. Only the variables that explain the distribution best as left in the model, barring the residuals of the data are normally distributed and that multi-collinearity is excluded. (University of Leeds, School of geography, website, course notes ND)

The relationship between researchers' perceptions of the *research process,* and their perceptions of the relevance of *researchers skills and attributes;* the perceived relevance of researchers' *knowledge* when conducting research, along with the *type of researcher* that executes research is explained in the following equation (derived from row 3 of Table 5.20):

Perception (*research process)* = 1.72 + 0.41x(*skills & attributes*) + 0.26x(*knowledge*) – 0.05x(*type of* researcher)

The dynamics of this equation can be illustrated by the following examples:

(i) If, for example an expert researcher who publish with ease (code '1' for type of researcher), perceive the *skills and attributes* of researcher as important (code '4' for *skills & attributes*), as well as *subject- and statistical knowledge* of a researcher important (code '4' for *knowledge score*) factors for the production and publication of research, then his/ or her perception score for the relevance of the *research process* to publishing research can be calculated as follows (by substituting the various codes into the regression equation):

Perception (*research process)* = 1.72 + 0.41x(4.0) + 0.26x(4.0) – 0.05x(1)
= 4.40

The value of 4.4 represents a rating score of 'really important' on the Likert rating scale of the closed ended questionnaire (The questionnaire is appended in Appendix 5.2 of this chapter). The deduction can thus be made that expert academic researchers who publish with ease and who perceive the *knowledge* of researchers, as well as their research *skills and attributes of relevance* ('really important' rating) to research, will also regard the *research process* as relevant or 'really important' – to ROP. The perception that how research is executed – the research process – is dependent on the type of researcher; the skills and attributes of these researchers; as well as their knowledge and experience.

(ii) If, for example an inexperienced researcher who battle to publish (code '4' for type of researcher), perceive the *skills and attributes* of researcher as irrelevant (code '1' for *skills & attributes*), and also perceives *subject- and statistical knowledge* of researchers as irrelevant (code '1' for *knowledge score*) to research, then his/ or her perception score for the relevance of the *research process* to publishing research can be calculated as follows (by substituting the various codes into the regression equation):

Perception (*research process)* = 1.72 + 0.41x(1.0) + 0.26x(1.0) – 0.05x(4)
= 2.19

The value of 2.19 represents a rating score of 'not really important' on the Likert rating scale of the closed ended questionnaire. The deduction can thus be made that inexperienced researchers who battle to publish and do not appreciate the relevance of *knowledge* and *skills* in research, will also attach little value to the importance of the *research process* – the procedural steps of the research process – as of little value to effective publication of research.

The question that further needs to be answered is what this model implies for the categories of the *research role player, attitude* and *research resources* with reference to relational links to the *research process category*? This research can state that the effect of the *research role player-, attitude-* and the *research resources* categories are not negated in this model because the *knowledge* category – which is included in the regression model – is highly and significantly correlated with both the *research role players* and *research resources* categories (Table 5.18 refers: correlation coefficients of 0.58*** and 0.65*** respectively); while *the skills and attributes* category

is also statistically significantly correlated with *role players* (a correlation coefficient of 0.64*** is reported in Table 5.18). This implies an indirect impact of *both role players* and *research resources* on the *research process*. Likewise is *attitude* statistically significantly correlated with *skills and attributes* (r = 0.33) on at least the 10% level of significance. This is once again indicative of an indirect relationship between *attitude* and the *research process*. (The effect of multi-collinearity is countered in the model by excluding variables that are highly correlated).

In conclusion the following serve to solidify theory formulation:
K*nowledge, skills and attributes*, and *researcher-type* directly impact the *research process*, while the concept of *role players, attitude and research resources* indirectly impact the *research process* via *knowledge* and the *skills and attributes* categories.

Table 5.20: Stepwise linear regression results

Step wise linear regression: $y_i = \alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \beta_5 x_{5i}$.
five steps of the forward selection method
where **:** y_i represents the set of research process scores of participants;
x_{1i} - x_{5i} the five steps of category scores for each participant;
α the intercept of the linear regression equation;
and β_1 - β_5 the regression coefficients for the five category effects

Step	F value	R-sq	C(p)	α Intercept	β_1 (x_1:Skills)	β_2 (x_2: Knowledge)	β_3 (x_3: Researcher)	β_4 (x_4: attitude)	β_5 (x_5: Role players)
1	46.66***	0.61	11.06	2.11***	0.53***				
2	33.04***	0.70	4.40	1.59***	0.42***	0.26**			
3	24.49***	0.72	3.50	1.72***	0.42***	0.26**	-0.05$^{\#}$		
4	19.15***	0.74	3.97	1.60***	0.39***	0.26**	-0.07*	0.10^{ns}	
5	15.46***	0.75	5.08	1.46***	0.35***	0.23*	-0.8*	0.10^{ns}	0.11^{ns}

Significance legend:
***: significance level of 0.1%; ** : significance level of 1%; *: significance level of 5%; $^{\#}$: significance level of 10%; ^{ns}: not statistically significant

True to the cyclical collection-analysis-comparison (or questioning) nature of the analysis approach described in this chapter, the latest insight on core category relationships in conclusion asks whether the impact of the *researcher type* on ROP theory can be explained in more detail? Towards profiling the researcher within the research environment against measured variables, a discriminant analysis was performed to determine how and to which extent ROP categories discriminate between researcher types. This is discussed in the concluding sub-section 5.3.5.2.

5.3.5.2 Discriminant analysis: what discriminates between the more and less productive authors?

A step-wise discriminant analysis was performed[102] to determine which ROP factors distinguish between the four academic researcher groups of,

[102] Discriminant analysis serves the same purpose as multiple linear regression analysis of predicting outcome, but with a categorical (> 2 groups) dependent variable and interval-scale explanatory variables. The analysis profiles group-membership via selected predictor variable interval ranges and predicts group-membership of new cases via the prediction equation:

i. Expert researchers who publishes their findings effectively;
ii. Experienced researchers who also publish effectively;
iii. Experienced researchers who battle to publish their findings; and
iv. Inexperienced researchers who battle to publish their findings,

The analysis was evaluated against researcher-type as classification variable and the quantitative interval-level measures (perception scores) of the ROP categories (SAS Institute Inc 1999:3154-3179; Burns and Burns 2012: 589) as potential explanatory variables. Although sample size in this research was limited (N=32) and the discriminant analysis would only serve an explanatory purpose of suggesting a profiling systems for the type of academic researchers that publish, the assumptions for discriminant analysis were satisfied, namely distinct researcher-type categories; more than two researcher-type categories; interval scale explanatory variable; and approximately equal proportions of participants per researcher-type group (Burns and Burns 2012: 589-590)[103].

Table 5.21 provides a summary of the analysis results which reports on the three steps of the analysis (steps 1 – 3): for each step the partial R square, associated F-value and significance level of the F value, as well as tolerance level are reported prior to an explanatory variable being selected to enter the discriminant model. The greatest F value reported (along with other inclusion criteria) then identifies the explanatory variable for entry in the model. For each step, the last four columns of Table 5.21 report on the criteria (after inclusion of the identified explanatory variable) for deciding whether a variable entered should remain in the model – Wilk's lambda- and the ASCC (average square canonical correlation) criteria. For example, step 1-results indicate that the *research process* category was identified as the explanatory variable with the highest discriminatory power and the Wilk's and ASCC criteria indicated that the entered variable could remain in the model. In the second step the *attitude* ROP category was identified and entered as a further predictor variable in the model. The third step indicated that no further predictors or explanatory variables could be entered into the discriminant function.

The *research process* and the *attitude of researchers towards research* were therefore indicated as effects that discriminate between the four categories of researchers. Table 5.22 illustrates the implications of the findings by reporting the individual perception scores of participants on *research process* and *attitude* measures. Inspection of these two measures for the four researcher-types groups clearly indicates how the magnitude of the two measures (especially a*ttitude*) discriminates between the four groups. The mean *attitude* scores reported in the second to last row of Table 5.22 summarises the discrimination: the lowest *attitude* score is reported for the expert group who publish effectively (mean score of 2.64), and the highest attitude mean score for the inexperienced researcher group who experience difficulty publishing (mean score of 4.13). Since most of the questionnaire statements on *attitude* (Table 5.10) concern responsibility roles, the lower rating values (a tendency towards disagreement) are interpreted as indicating that researchers accept more responsibility for their research (the more experienced and expert researcher). For example, *attitude* statements q2.16 states, '*When a research team plans research, issues of reliability is a*

$$D = v_1X_1 + v_2X_2 + v_3X_3 \ldots\ldots + v_iX_i, \quad i = 1 \text{ to } n$$

where D: discrimination function; v: discriminant coefficients of predictor variable; X respondent score for the predictor variable; i: the number of predictors (Burns and Burns 2012)

[103] The STEPDISK procedure of SAS version 9.4 was used to do the analyses (SAS Institute 2013).

team responsibility' and question 4.15 states, '*In mixed and quantitative research the statistician assumes responsibility for accurate analysis reporting'*. Lower scores (disagreement) to both these questions indicate that such participants (in this instance the expert/experienced researcher) assumes more responsibility on mentioned issues.

This discrimination implies that *attitude towards research* and *the research process* – in other words acceptance of role-responsibilities in research and how researchers execute the various stages of research planning; research execution and data collection; data analysis and interpretation; and research write-up and submission, discriminates between the more experienced researcher who publishes more readily and the experienced towards inexperienced researchers who take more time to publish their research findings.

The effect of both *attitude* and *research process* discrimination is graphically displayed in Figure 5.4.

Table 5.21 Summary of results of step-wise discriminant analysis to assess the discriminatory power of the *research process, attitude, research resources, role players, skills and attributes and knowledge* to distinguish between *researcher-type* groups.

The ROP-category perceptions scores are entered as explanatory variables. Relevant F statistics and significance levels are included as well as tolerance criteria. (N = 32; experience levels=4)									
Selection criterion	ROP Categories to consider	Partial R-square	F value	Pr > F	Tole-rance	Criterion	value	F value	Pr > F
Step 1 (No explanatory variable entered in the model; which effect to include in the model?)									
	Prior to entering any explanatory variable: identifying variable with most discriminatory power – the greatest F-value; being r *process* (df = 3; 28)					Criteria calculated once the *research process* has been is entered into the model			
Hghest F value enters model	R Process	0.2127	2.52	0.07	1.00				
	Skills	0.1995	2.33	-.09	1.00	Wilk's lambda	0.78	2.52	0.07
	Attitude	0.1352	1.46	0.25	1.00	ASCC	0.07		
	R Resources	0.1064	1.11	0.36	1.00	Wilk's lambda approaches zero and ASCC approaches 1 if discriminatory power between researcher type is explained by effect/s entered in the model			
	Role players	0.0703	0.71	0.56	1.00				
	Knowledge	0.1520	1.67	0.19	1.00				
Step 2 (*Research process* entered; which effect next to enter in the model; should effect be removed?)									
	Prior to entering another exploratory variable (barring *research process*) in the model: identifying the variable with most discriminatory power – the greatest F-value; being a*ttitude* (df = 3; 28)					Criteria calculated once the *research process* and *attitude* have been entered into the model			
Hghest F value enters model	Skills	0.1752	1.91	0.15	0.3914	Wilk's lambda	0.62	2.40	0.03
	Attitude	0.2081	2.37	0.09	0.9080	ASCC	0.15		
	R Resources	0.0851	0.84	0.49	0.9684	ASCC: Average square canonical correlation			
	Role players	0.0749	0.73	0.54	0.5846				
	Knowledge	0.0382	0.36	0.78	0.5826				

Table 5.21 (step 3 continued): Summary of results of step-wise discriminant analysis to assess the discriminatory power of the *research process, attitude, research resources, role players, skills and attributes and knowledge* to distinguish between *researcher-type* groups.

Step 3 (*Research process and attitude* entered; which effect next to enter or remove from the model?)						
	Prior to entering another exploratory variable (barring research process and attitude) in the model: identifying the variable with most discriminatory power (df = 3; 28)					NO further effects added, therefore no criteria calculated
Highest F value enters	Skills	0.1672	1.74	0.18	0.3807	
	R Resources	0.0990	0.95	0.43	0.8694	
	Role players	0.0891	0.85	0.48	0.5454	
	Knowledge	0.0491	0.45	0.72	0.5354	

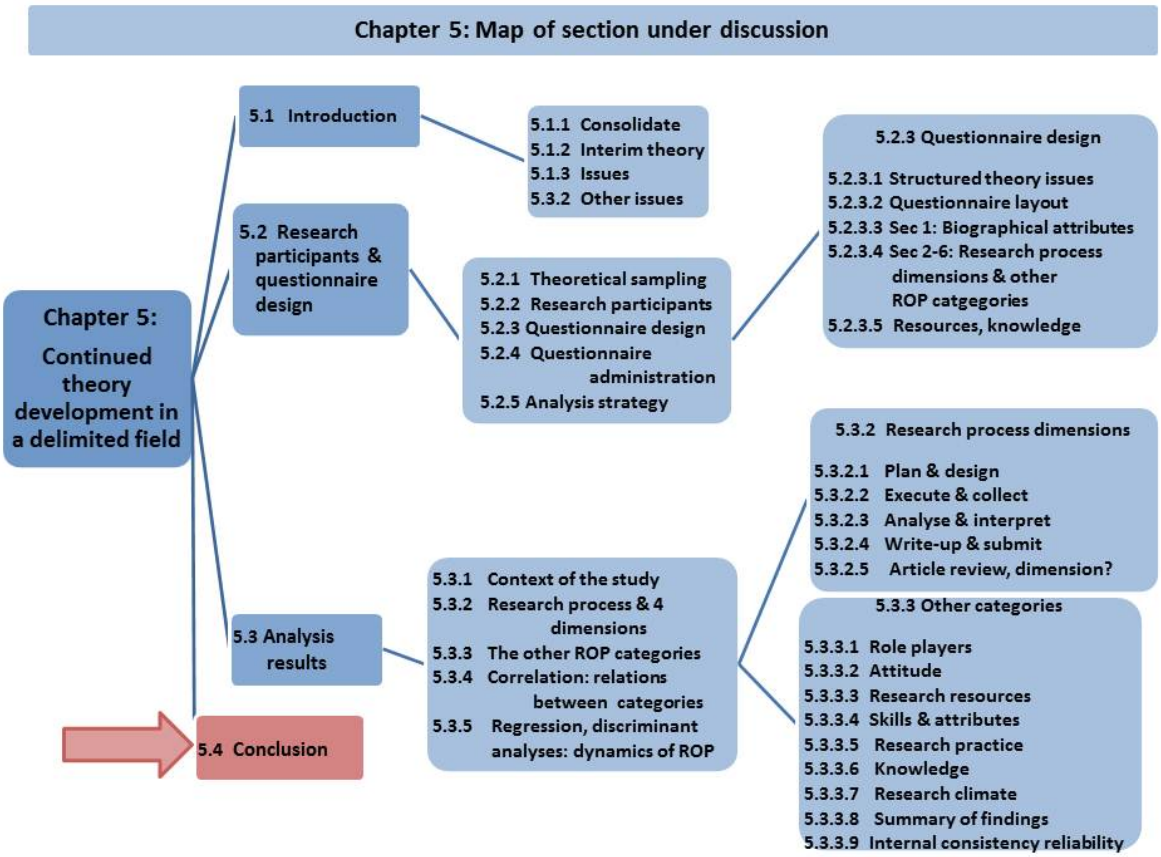
Table 5.22

The individual *research process* and attitude scores, as well as the mean scores for the four groups of author-researchers profiling the four groups with respect to attitude (towards research) and the research process (how researcher perceive the research process)

Perception legend: 1 = 'strong disagreement/ irrelevant' ….. 5 = ''strong agreement/ critically important'

	1. Experts/ publish effectively n_i = 8, proportion = 0.25		**2. Experienced/ publish effectively,** n_i = 5, proportion = 0.19		**3. Experienced/ battle to publish,** n_i = 8, proportion = 0.31		**4. Inexperienced/ battle to publish,** n_i = 8, proportion = 0.25	
Obs	**Research process**	**attitude**	**Research process**	**attitude**	**Research process**	**attitude**	**Research process**	**attitude**
1	4.84375	3.76923	3.90625	2.84615	4.59375	2.76923	4.09375	3.07692
2	4.61290	2.50000	4.12500	3.46154	5.00000	4.38462	3.68750	2.46154
3	4.75000	2.84615	4.28125	2.69231	4.68750	2.84615	4.87500	4.30769
4	4.31250	2.23077	3.80645	2.83333	4.78125	3.61538	4.53125	2.92308
5	4.31250	2.61538	3.65625	2.84615	4.53125	3.84615	4.68750	2.76923
6	4.53125	2.23077	4.46875	2.69231	3.50000	2.53846	4.31250	2.92308
7	4.37500	1.76923			4.68750	3.00000	3.53125	3.84615
8	4.34375	3.15385			4.50000	3.00000	4.12500	2.92308
9					4.43750	2.83333		
10					4.06250	2.46154		
Mean	4.51	2.64	4.04	2.90	4.48	3.13	4.23	3.15
Std deviation	0.21	0.62	0.31	0.29	0.42	0.62	0.47	0.61

5.4 Conclusion



In conclusion the question can be asked whether the advanced cycles of analysis, comparison and questioning reported in Chapter 5 serve to address the issues outlined in Section 5.1.2 and 5.1.3, and Tables 5.1 and 5.2, and, in doing so succeeded in refining the theoretical model that explains ROP. To this the reply is a positive 'yes' response. With regards to questions asked of continued evolving theory, the findings of the analysis results can be used to argue as follows:

- In Section 5.1.2 the issues of a more manageable approach to theory development within a delimited substantive researcher field and quantification of theoretical components of the ROP model were questioned. The results of advanced analysis indicate how theory-dimensionality can be reduced to eight categories (the *research process*; *attitude; skills and attributes; research resources; research climate; research practice; and role players*) and furthermore, how these concepts of ROP could be quantified to allow further detailing of ROP categories and their interrelationships. These findings are briefly summarised below and in Table 5.23, and are presented as a final theoretical model in Chapter 6.
- Tables 5.4 – 5.14 of this chapter, which present an exploratory assessment of participants' perceptions of the importance of specific conceptualised events in the production and publication of research findings (articles), illustrate that quantitative measures of perceptions of ROP categories and dimensions can be formed and can be used to evaluate relevance with respect to ROP. Furthermore, the quantified measures of category and dimension relevance serve to clarify the issues asked of the theory in Table 5.2.

- For example, findings indicated that the *ethical review pro*cess could be regarded as a sub-dimension of the *planning and design* dimension of the *research process*; that the *peer review process* could be seen as a sub-dimension of the *write-up and submit* dimension of the *research process* category; that *managers* form a dimension of the *role-players* category; that *research resource centres* form a dimension of the *research resources* category; and that the mindset of researchers resides within the *attitude* category, but that *research-motivators* such as incentives reside within the *research climate* category. In this way analysis findings listed in Table 5.15, Section 5.3.3.8 (and Table 5.23, below), answer to the issues regarding theory development listed in *Table 5.2* of Section 5.1.2.

- Table 5.2 also raises several questions relating to theoretical code –explains the dynamics of research output productivity as it relates to published articles. Section 5.3.4 (Tables 5.17- 5.19) firstly verifies specific relationships within and between categories and dimensions and confirms the *research process* category as the core category of ROP theory by means of correlation matrices.
-

Multivariable regression analysis (Section 5.3.5.1) and discriminant analysis (Section 5.3.5.2) furthermore succeed in describing the joint effect of ROP categories on the core category and profiles academic researchers – based on experience and publication efficacy – by means of *attitude* and how they follow the procedural steps of doing research – the *research process.*

- The newly acquired insight in the ROP model enables research to present a refined model of ROP in Chapter 6.
- At this stage the appropriateness of the closed-ended questionnaire as data source to identify and refine factors or events that affect the publication of academic articles can be considered. In this regard research can confidently argue that without the input of participant responses (the very people that produce research and publish) to closed-ended questions, the appropriate quantification of specific ROP concepts would not have been possible – which answers to the applicability of the closed-ended questionnaire. In a sense this data source brought a limitation to the study since concepts that moved to the foreground during analysis of this source (e.g. research *climate, research practice*) and which were not anticipated/perceived as stand-alone categories when the questionnaire was designed, could not be quantified in the analysis cycles that followed and alternative data sources had to be employed to inform these categories. The afore-mentioned argument in favour of the approach followed in this study argues that GTM makes provision for exactly such instances by allowing theoretical sampling from other data sources, e.g. the literature. In the mentioned instances the literature succeeded in densifying these two categories (the last mentioned limitation can pave the way for recommendations in the next chapter, Chapter 6, with a suggestion that further research can either investigate and refine the eventual ROP model of this study quantitatively with a questionnaire adjusted to incorporate the categories that evolved too late in the research or future research could narrow down research to specific categories of the ROP model, for example, the *research process* and *role responsibilities* dimension of the role players category which proves to be very relevant to ROP.

With regard to a refined theoretical model for ROP, the highlights of additional insights, gained from the exploratory perception score-distributions of ROP categories, correlation, regression and

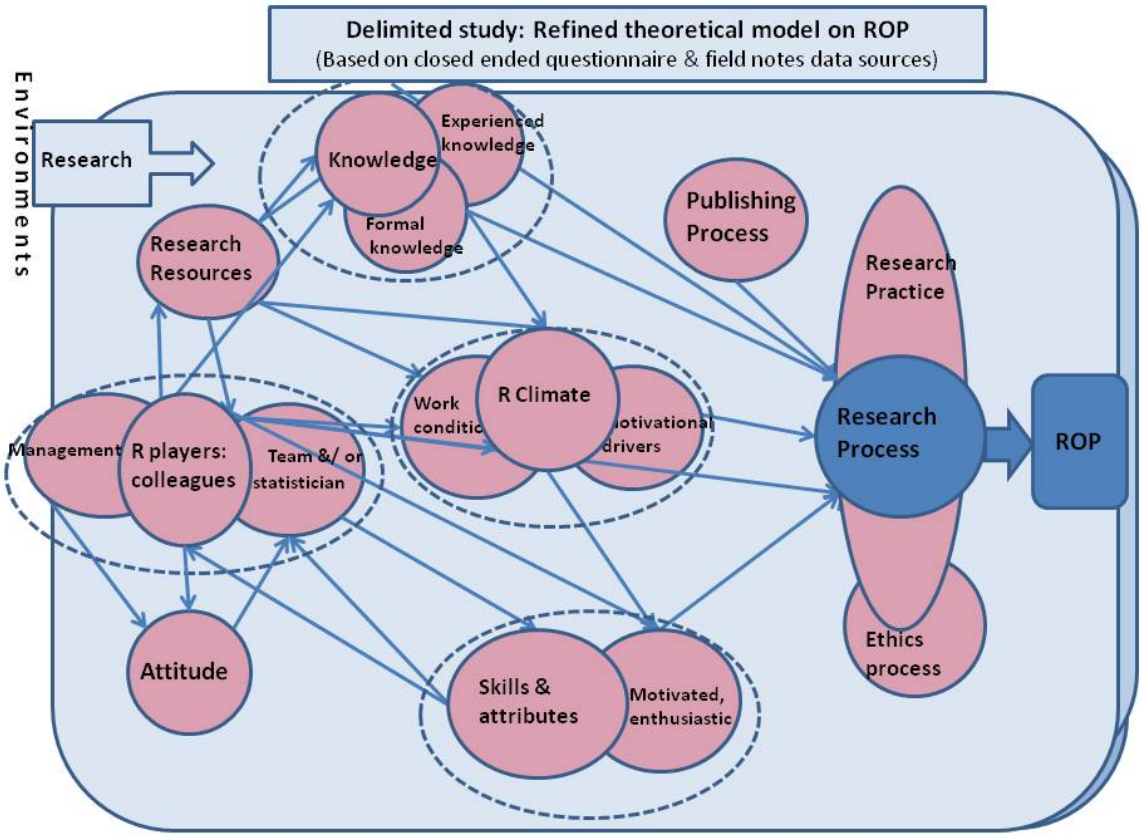
discriminant analyses are summarised below. The approach proved very successful in detailing categories and relational links, which translates into detailing theoretical code. The summary table of Section 5.3.3.8, Table 5.15 was added to accommodate the findings of Section 5.3.4. These additional findings are presented in Table 5.22 below.

Table 5.22: Summary of the main deductions of the refinement of theoretical code for the ROP model (Section 5.3.4 refers)

Theoretical code that relate to:	Main finding/s
Research process	• Quantitatively and qualitatively verified that the *research process* category acts as core category of the theoretical model of ROP. This is justified because the quantifiable ROP categories of *knowledge, role players, skills and attributes* and *attitude* correlate statistically significantly with the concept *of research output* (Table 5.19). Literature confirms dependencies of the *research process* with concepts of *research climate* and the *research practice* categories (sections 5.3.4.2), thereby confirming that the research process category links (albeit directly or indirectly) to all other ROP categories • Because of the core-category property of the research process the *research process* can be regarded as a dependent variable in further quantitative analyses, which opens up the option of regression analysis. • Further theory refinement: *knowledge, skills and attributes*, and *researcher-type* directly impact the *research process.* The relationship can be detailed as follows Perception of research process = function of (knowledge; skills and attributes; researcher type); In terms of regression coefficients the relationship is described as (**Research process perception) = 1.74 + 0.41 x (*skills & attribute* perception) + 0.26 x (*knowledge* perception) – 0.05 x (*researcher-type*)** • Another type of relationship is also indicated, namely an indirect relationship (Table 5.19) which indicates that the concepts of *role players, attitude* and *research resources* indirectly impact the *research process* via *knowledge* and the *skills and attributes* categories (because of statistically significant correlations indicated between these categories).
Type of academic researcher	• Discriminant analysis, Section 5.3.5.2 and Table 5.21 and 5.22 suggest that researcher –type can be profiled (based on research experience and publication proficiency) • The ROP categories of *attitude* and the *research process* discriminate between the levels of experienced and proficient academic researcher. This discrimination implies that the more experienced researcher accepts more responsibility for their part in the research process, e.g. when doing his research.

A visualisation of the refined ROP model is presented in Figure 5.4, which builds on the initial visualisation of theory in this chapter captured in Figure 5.1. This visualisation indicates how category description advanced. The depicted theoretical model (along with details of research findings in Chapter 5) will enable Chapter 6 to present the final theoretical model of ROP, note the limitations of the research and suggest grassroots recommendations as to how ROP can be improved to the betterment of the research standing of UNISA as an institution and to academic researchers who work endlessly to produce and publish research.

Figure 5.4: A diagrammatical presentation of developed ROP theory



(The appendices of Chapter 5 are included in the General Appendix at the end of the thesis)

Chapter 6
A theoretical model on the dynamics of research output productivity: a statistical perspective

6.1 Introduction: a recap

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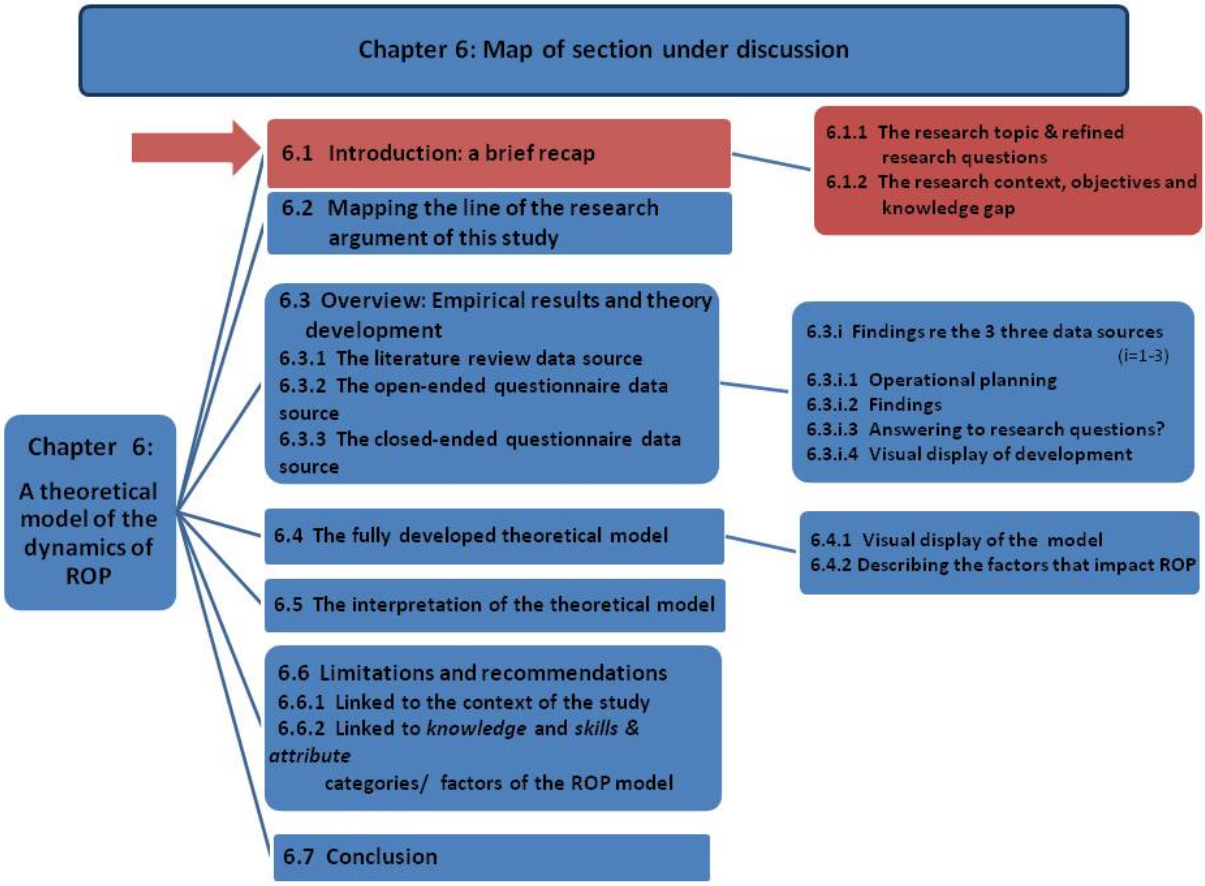


6.1.1 The refined research topic and research questions in GT context

This section presents a brief recap of the research setting and findings to frame the final discussion of the deductions and the presentation of a theoretical ROP model that integrates all components of the developed theory.

Two comments below illustrate the research context of the investigation:

> It is the statistician's responsibility to ensure that quantitative research findings are properly reported in submitted articles – not the researcher's
> (Comment of the chief academic researcher of a research project, 2011 – field notes)

> What is this *means* and *standard deviation* words and figures in the text – it must be defined extensively before using

(Journal peer reviewer's comment to the statistical section of a submitted article. Field notes of the researcher of this study on a 2012 joint article submission).

These examples illustrate the type of practical research support experiences that this researcher (as research support statistician), often encounter. These type of experiences initially served as a trigger to model the dynamics of effectively publishing research findings in accredited journals. In this statistical support capacity the process of doing research and publishing findings[104] - and doing so effectively - is experienced and observed on a daily basis. Furthermore, efficiency is naturally of concern to researching academics who strive to advance their careers, improve their scholarly knowledge and establish themselves as recognised researchers.

Furthermore, as motivated in Chapter 1, a continual flow of new knowledge is critical to all spheres of society who base decision making, planning, advancement and development on new , reliable and timely relevant knowledge. A reliable source of new knowledge is to be found in published research. This for example, motivates the South African government's objectives of promoting and increasing doctoral qualifications (and post-doctoral research)in the academic community since the academic community conducts research and publishes their findings (new knowledge). The SA government has for example stated the objective of delivering 5 000 new doctorates per annum (MacGregor, 2014; HESAQ, 2014), and, also stimulate research and the publication thereof via incentives in the SA research policy (HESA 2014). The policy determines that the amount of research funding allocated to higher education institutions be directly proportional to the research productivity of the specific institution.

Journal publication forms a substantial component of internationally acknowledged research output. Academic and research recognition of higher educational institutions is therefore rated according to international standards[105] and research output indicators[106]. These include, for example, the criteria of the number of publications in scholarly international journals, various citation indices and measures of the impact-factor of journals (Manville 2014). Universities strive for international recognition as research- or research-intensive institutions and therefore work towards increasing their article publication rate. Along the same line, for academic researchers, international recognition and career advancement are inextricably linked to publication output which serves as stimulus to publish successfully. Sustaining and increasing research output is a priority for several stakeholders.

Topic- and the research question-formulation of this GT study

With the interest in research output productivity (ROP) motivated in Chapter 1, the introductory literature review of Chapter 2 indicated that little research has been conducted on producing and publishing research findings from the perspective that concerns this research, namely the vantage point of research support statisticians. Chapter 2 therefore motivated a classic GT approach as an appropriate research methodology for this study because of the theory-generating properties of the method.

[104] Published research findings in the form of articles published in DHET-accredited journals.
[105] Examples of these standards include the Research Excellence Framework (REF) of the UK and Excellence in innovation for Australian impact assessment (EIA).
[106] Measurement of article output performance is referred to as the field of altmetrics.

It was indicated in Chapter 2 and more so in Chapter 3, that the formulation of a research topic- and questions in GT application follows a unique process. The idea that theory continues to emerge throughout analysis cycles[107] of GT application sets this methodology apart from other research approaches. The literature refers to this property as a data-driven and emergent research design (Tavakol, Torabi and Zeinaloo 2006:12; Ng and Hase 2008:158-159).

Continually emerging theory has implications for topic- and research question formulation (Fei 2007:13; Ng and Hase 2008:158-159): Newly acquired knowledge gained in continuing analysis cycles, brings a deeper understanding of the researched phenomenon - which assists in refining theory, but at the same time, deeper exposure to the researched phenomenon (via data collection from research participants) calls for the continual adaptation or refinement of the research topic and research questions to address new concerns or uncertainties that arise(Tavakol et al 2006:12; Hutchinson 2001; Backman and Kyngas 1999; Glaser 1978). Topic and/or question formulation in GT research is therefore a gradual process of adjustment to reflect newly expressed concerns or issues that come with a deeper understanding of the research field and phenomenon.

Chapters 4 and 5 illustrated how the research question became more focused and how a continual adjustment of the research question/s and sub-questions go hand-in-hand with theory development. Tavakol et al (2006) points to the fact that although the main research question remains flexible and broad (McCallin 2003: 206), sub-questions are often formulated to address specific theory development issues that, at specific stages, ask specific questions of developing theory (for example 'yes/no' type of questions not conventionally asked of research: 'Does *environment* constitute a category of the ROP model?'). The reason for this is that continued theory development often depends on specific issues being resolved before theory can develop further. For example, in this research the verification of *environment* as a category of ROP theory precedes delimitation of the study-field to the *researcher environment.* This step/decision enabled the research to narrow down the substantive area which, in turn, enabled development of further detailed conceptualisations and relationships. Theory development therefore depends on resolving interim time-chronological (sub)-research questions that explain the building blocks required to further develop theory.

The discussion of GT methodology in Chapter 3 indicated that GT research is by nature exploratory and descriptive which supports the formulation of research questions rather than hypotheses (Tavakol et al 2006:12) and which explains the use of research questions in this study. As McCallin remarks (2003:203), the purpose of the formulation of a research question in GT research is to assist in explaining "what is actually happening in real life". Against this background, the progression of the refinement of the research topic and/or questions is briefly summarised.

Chapter 1 described the initial research topic of the study as the phenomenon of 'research output productivity'[108]. A deeper understanding of the research field at this stage also suggested that the concept of research *productivity* should receive precedence over the concepts of *research*

[107] This implies data collection, analysis and comparison of data and ensuing conceptualizations.
[108] The initial research topic was defined as, 'A statistical perspective on factors that affect ROP'.

publication and/or *research proficiency.* It was argued that the two last mentioned concepts are both implied in the concept of *research productivity* and describe aspects of productivity (Chapter 2).

The initial research question, posed in Chapter 1, therefore asks, (complying with Ng and Hase (2008) suggestion of question formulation 'what is happening here?'):

'How do research related events and processes interact with research output delivery?'

In this study the phenomenon of ROP was furthermore investigated from the perspective of research support statisticians involved in the research process and publication of research findings. This is reflected in the refined research question of Chapter 3 that asks:

'Viewed from the perspective of research support statistician involved in the research process, how do factors and or events related to and within the research process affect ROP?

The refinement of the research topic of the study was based on the results of ongoing analysis cycles described in Chapters 4 and 5 that describe the enrichment and clarification of the categories of ROP. Developing theory suggested that the ways in which these categories affect the production and publication of research could be viewed as the *dynamics* of the ROP phenomenon. This led to the reformulation of the research topic as:

'Mapping the dynamics of ROP: viewed from the perspective of research support statisticians'

In the more advanced research cycles, discussed in the latter part of Chapter 4 and in Chapter 5, the research question of Chapter 3 was reformulated as two main research questions and several sub-questions to answer more specifically to issues of emerging theory. In so doing the questions promoted further theory development. The main research questions remained open and broad, while the sub-questions queried the relevance and refinement of emerging categories and their dimensions (the first research question), as well as the relational links between categories (the second research question), which paved the way for the integration of all the building blocks into a theoretical model.

The first research question asked,

Research question 1:
(i) What underlies the dynamics of ROP (in other words, the building blocks of ROP theory)?

With research sub-questions that queried specific issues of these ROP categories, namely:

- Does *environment* constitute a category of developing theory on ROP?
- Does *the environment of the researcher* constitute a dimension of the identifi*ed environment category?*
- Is it *sensible to* delimit the research field t*o the researcher environment?*
- Do conceptualisations of *environment; attitude; skills and attributes; research climate; the research process; research practice; research resources; research role players; knowledge and the peer review process* constitute relevant categories of the emerging theoretical model of ROP?
- *How* can these categories be quantified and their relevance to ROP verified*?* (Are these concepts quantitatively measurable?)

The second research question queried how factors impact ROP and was rephrased to ask,

Research question 2:

(ii) What is the nature of the *dynamics of ROP* (in other words, how do these factors interact to impact on ROP)?

Sub-questions that investigated specific issues of the relationships between categories asked:

- Does the *research process* category constitute the core category of the *ROP phenomenon?(*In other words how do categories relate to the *research process* category for the latter mentioned to be regarded as a core category*?)*
- How can the *dynamics* of the ROP phenomenon be quantified? (Are relational links quantitatively measurable?)
- Can the type of relationship that exists between the *research process* category as core category and the categories of *knowledge of researchers;* and *skills and attributes of researchers* be described as a direct type of relationship? (In other words, what is the nature of these relationships?)
- Can the type of relationship that exists between the *research process* category and the categories of *attitude towards research* and *role players* be described as an indirect type of relationship? (In other words, what is the nature of these relationships?)
- How can it be verified that the type of relationship between, respectively, the categories of *research climate; and research practice* present as indirect type of relationships with the *research process* category if these two categories could not be quantitatively measured? (In other words, how do these mentioned categories relate or interact?)
- How can different types of researchers be profiled based on *attitude towards research* and how they approach *the research process?*

Implied in the previous question is the issue of an additional researcher-dimension in the theoretical ROP model. Does this research succeed in presenting a theoretical model that explains research production and article publication as a final result?

6.1.2 The research context, knowledge gap and aim of the research

The research described in this thesis focuses on the process whereby academic staff[109] produce and publish research at an open and distance learning institution in South Africa, namely the University of South Africa (UNISA). The views of academic researchers and, to a lesser extent, practising statisticians, managers and journal editors were sought on how they experience doing research and publishing articles. Eighty three percent of the participants who completed open- and closed ended questionnaires in this study were affiliated to UNISA, while 17% of the quantitative and qualitative responses came from participants at other higher education institutions. The 17% comprised additional co-authors of articles (from other universities), an editor of an academic journal, and three practising statisticians. The level of research experience and proficiency in publishing articles were taken into account when academic researchers were approached to participate in this study.

[109] The researcher of this study provided statistical support to these academic researchers and co-authored articles with the academic researchers.

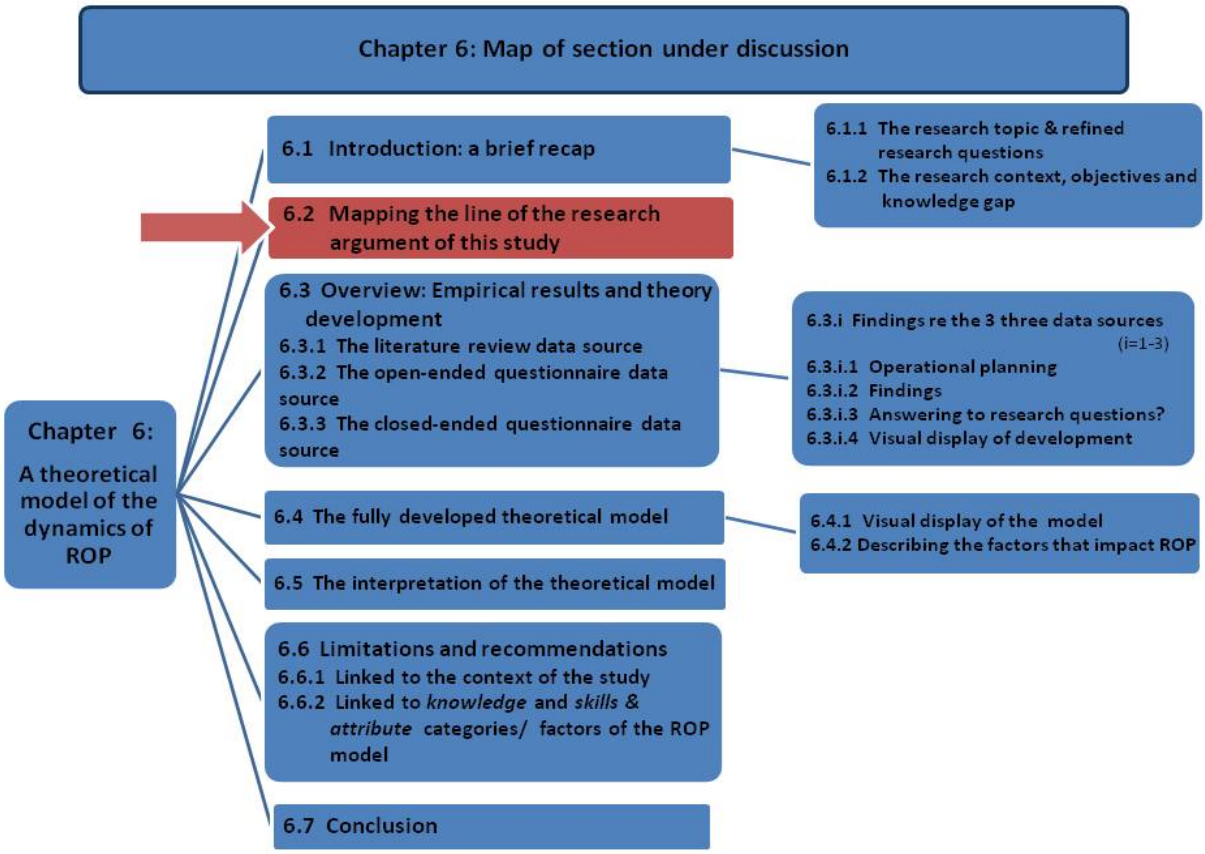
For the purpose of this research, research output is limited to published articles in DHET accredited academic journals and the focus of the study is on the ways researchers conduct their research with the aim of publishing their findings.

Interest in and investigation of ROP, from the perspective of research support statisticians, lends a unique approach to the study. The research furthermore identifies the topic of ROP - as perceived from the vantage point of support statisticians - as a gap in existing knowledge, since a literature search indicated that little research has been reported in this area (Chapter 2 verifies the knowledge gap). In this research context grounded theory presents as an appropriate research methodology (discussed in Chapter 3) to investigate the phenomenon.

The classic grounded theory approach used in this study allows data to be sourced from different sources as and when new information is required to inform theory development on ROP. These sources include the literature, field notes of the researcher of this study, informal communication with academic researchers, responses to an open-ended questionnaire as well as responses to a closed-ended questionnaire. These questionnaires were designed at various phases of research execution when research had progressed to a point where more information on specific aspects was required to inform theory development.

It seems reasonable to assume that a better understanding of the ways in which research findings can be effectively produced and published would assist academic researchers in improving their research output. Concomitantly, a better understanding of the dynamics of ROP would also assist research support statisticians to render their services to academic staff in a more efficient way. In this way the broader community that relies on the availability of new knowledge in decision making, policy formulation, development and more can be served with an increased article publication rate.
The next section, Section 6.2 briefly summarises how the research argument of this study unfolded to address the identified knowledge gap.

6.2 Mapping the line of the research argument of the study



This section summarises the argument of this study since the final integration of the theoretical model of ROP (presented in Section 6.4) is best appreciated if the entire argument line of the research is mapped before the model is presented. The cyclical nature of GT methodology and the use of several data sources – with the intermittent reporting of developing theory[110] - could be confusing if the final model of ROP is presented without a reminder of the originating argument.

The argument line of the research process - from initiation of the research to the presentation of the final ROP model - is explained by means of an argument map in Figure 6.1. Issues, consideration and reasoning, and decisions taken as research progressed, are presented by numbered boxes of the map. The box numbers follow the sequence of the research argument. The box-titles summarise the aspects argued/considered at specific stages. Each box also indicates (in brackets) sections of the thesis that discuss or argue actions or decisions taken. For example Box 1 indicates that the issue of 'a knowledge gap' in research is mentioned in Chapter 2, Sections 2.2; 2.3 – 2.6; and specifically in Section 2.6.2.4[111].

Box 1 of the argument-map indicates that the research began by considering specific research requirements and guidelines. These, for example, include consideration of the research paradigm of

[110] Reported in Chapter 4 and 5

[111] Although not all sections of the thesis that refer to a specific listed issue or argument are included in the map, the researcher attempted to include the most relevant sections.

the study when weighed against the research topic[112], research context, and existing knowledge gaps in the substantive field. The context of the study and the topic description has as their focus the academic researcher who conducts research and publishes findings. In addition, the research is undertaken from the perspective of research support statisticians who assist academic researchers in their research endeavours. The chapter-sections shown in brackets indicate that these topics were (re-)considered and addressed on several occasions during the research process to ensure research integrity.

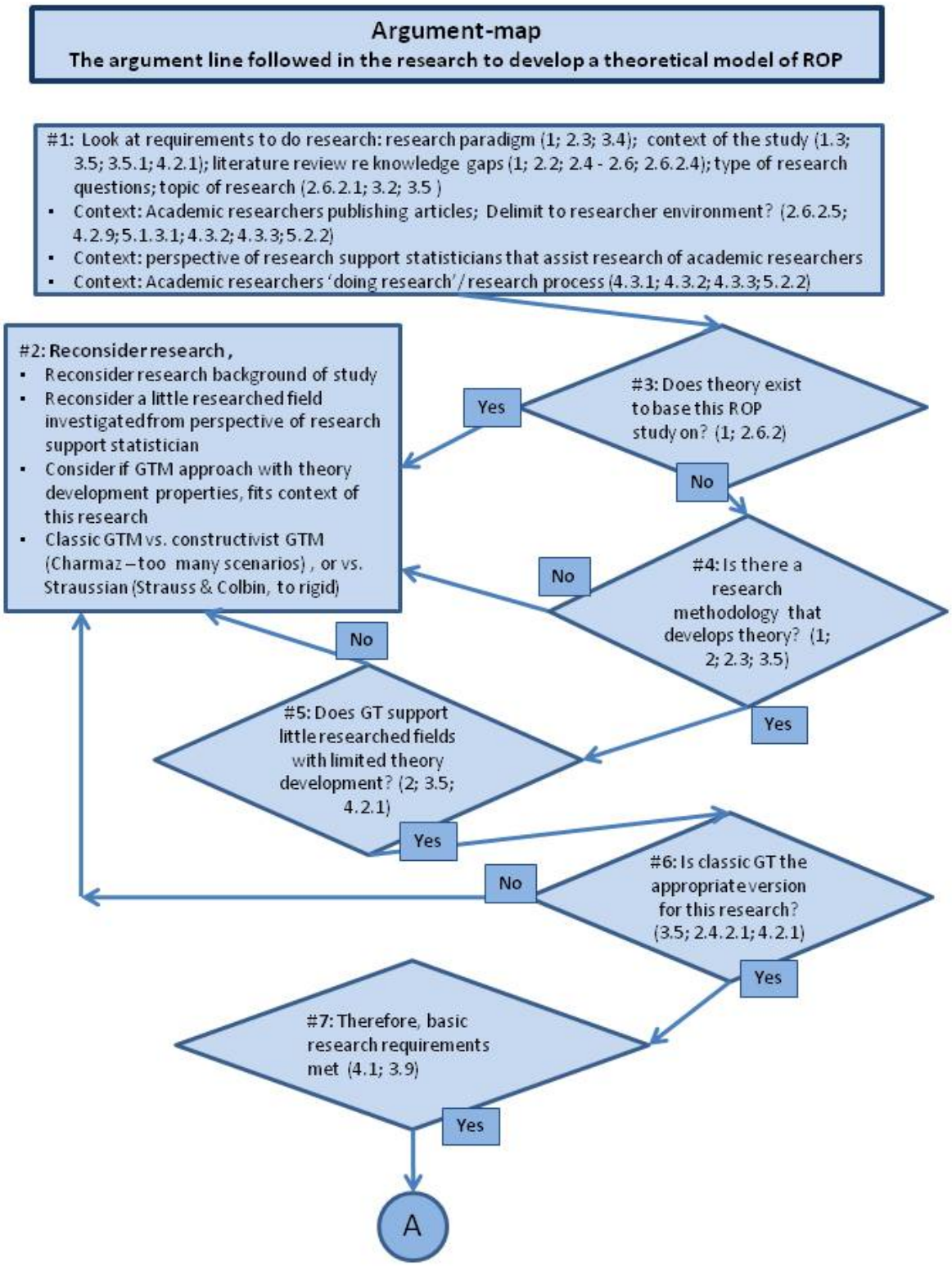
Box 2: The second square box in the map indicates the research methodology issues that required consideration. A decision on an appropriate research design and methodology for this study had to be taken based on the field of interest, and the type of knowledge gap/s that exist in the field had to be established. These issues had to be weighed against the research background of the study. GT methodology would be considered an appropriate research methodology for this study if it could be verified that *the production of research findings and the publication thereof, investigated from the perspective of research support statisticians who assist academic researchers with their research,* is an under- researched field with a limited development of theory. This argument is illustrated in more detail in Boxes 3- 5 of the argument-map. The most appropriate version of GT methodology suitable to the research context of the study also required consideration (Box 6) and had to align with the research philosophy that underlies the study (the choice of classic GT as the most appropriate methodology). Research discussions on these aspects are mainly reported in Chapters 2 and 3, with references again to specific aspects in Chapter 4. Box 7 indicates that the GTM could only commence once research requirements had been carefully considered.

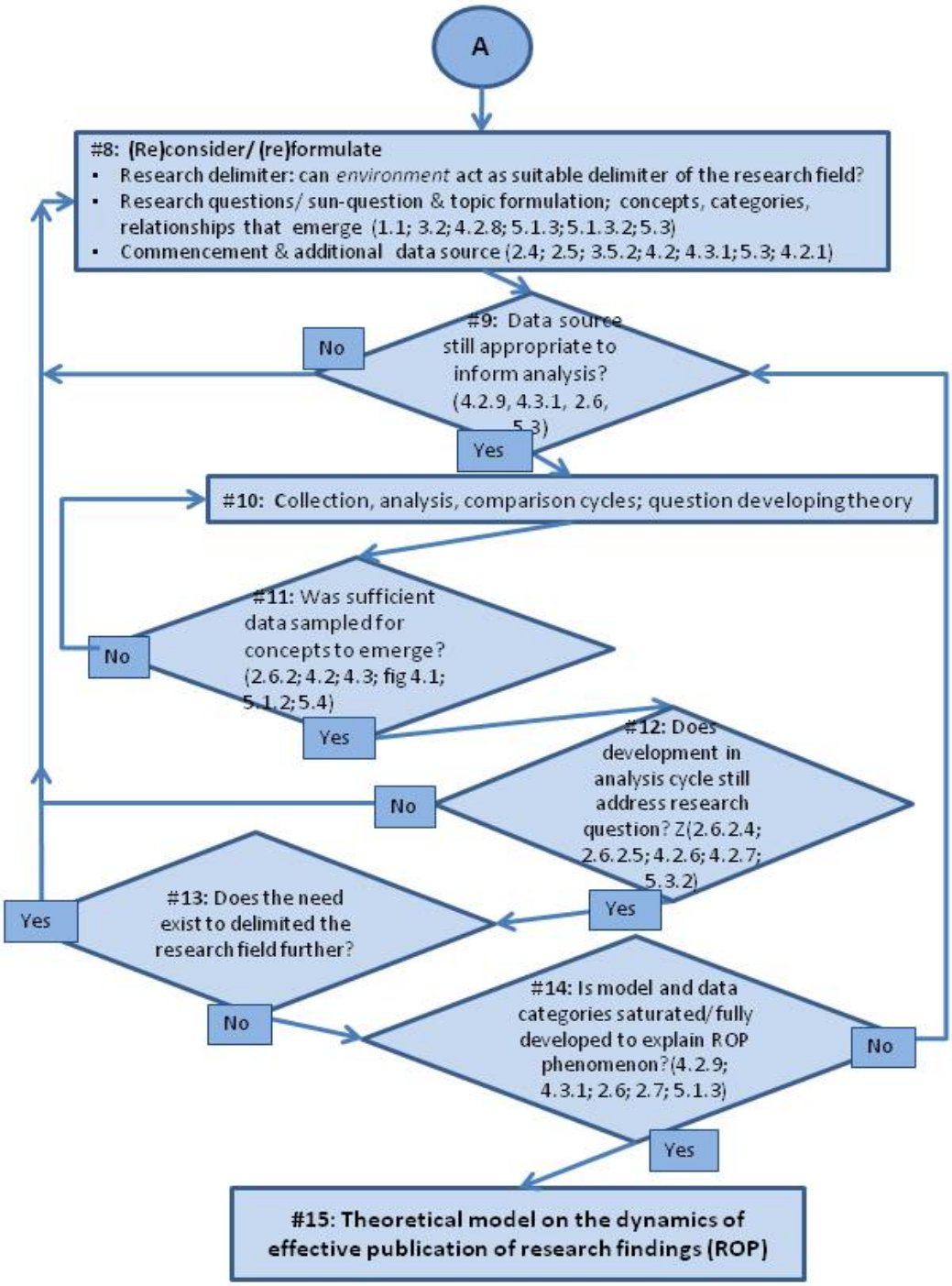
Research commencement and subsequent cycles of GTM data-collection, analysis and comparison are illustrated in Boxes 8 to 15. The actions and considerations included in this part of the argument-map show that theory development, research topic and research (sub)-question refinement, delimitation of the research field and the relevance of particular data sources to inform further theory development were evaluated in each analysis cycle[113] of GT implementation (Box 8). These aspects were evaluated prior to the implementation of a next cycle of data collection, analysis and comparison (Box 10).

Three principle data sources were identified as relevant to research namely, the literature[114] (initial analysis cycles), responses to an open-ended questionnaire (interim analysis cycles) and responses to a closed-ended questionnaire (advanced analysis cycles). Initial literature analysis cycles delivered an overload of general information/events related to the production and publication of research. The created to delimit the research field became obvious. A delimited research area would promote a more specific and detailed theoretical model. An appropriate delimiter was therefore investigated and is queried in Box 13 of the map. Boxes 11, 12 and 14 evaluate theory development, (i) by questioning the emergence of new concepts or more abstract concept; (ii) by comparing developing theory to interim research questions; and (iii) by evaluating developing theory's ability to explain ROP comprehensively. The research terminate when the model is saturated (Box 15).

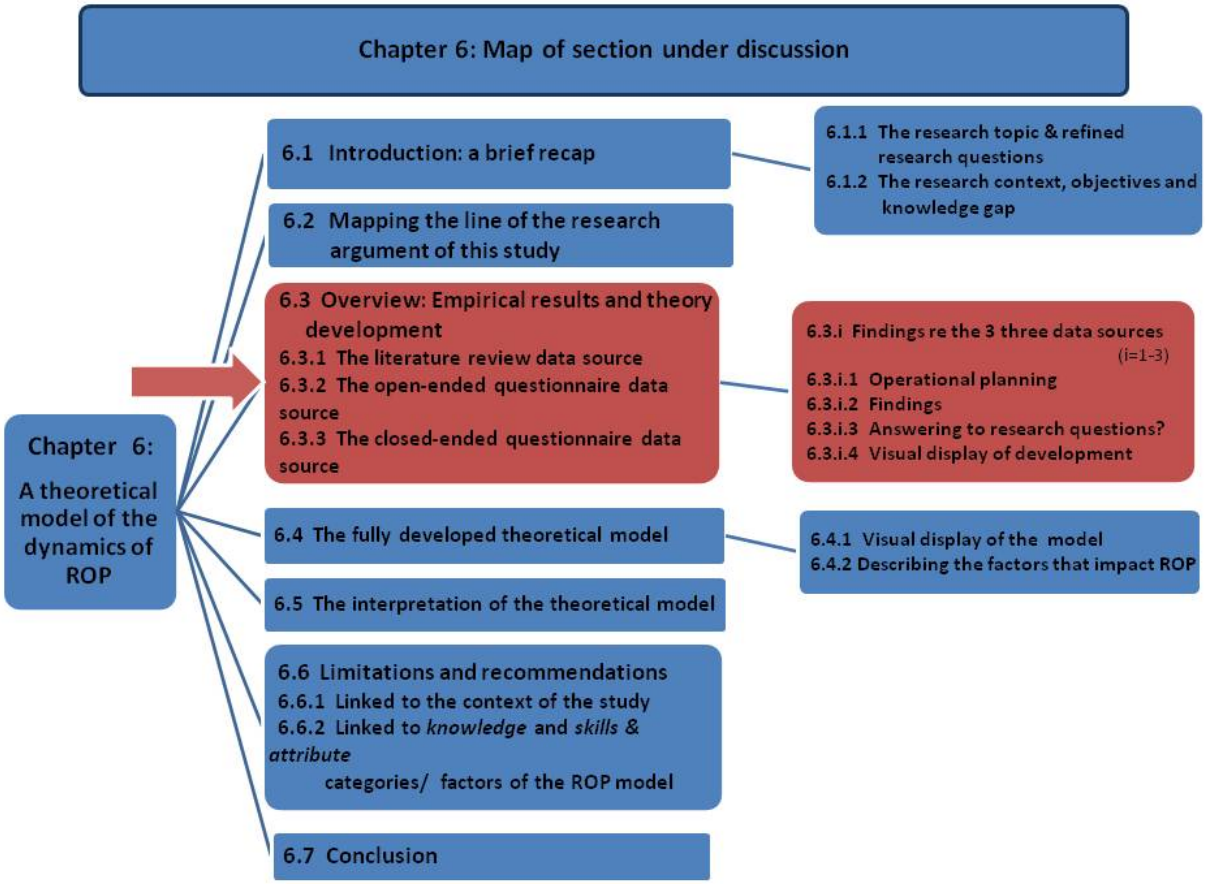
[112] The research topic was tentative at this stage.
[113] An analysis cycle in this sense implies data collection, analysis and comparison associated with GT method.
[114] Chapter 4 motivates the decision of this research to use the literature as commencement data source and Chapter 2 motivates the type of literature review deemed appropriate in GT research.

Figure 6.1: A map of the research argument followed in this study on ROP




A
#8: (Re)consider/ (re)formulate
Research delimiter: can environment act as suitable delimiter of the research field?
Research questions/ sun-question & topic formulation; concepts, categories, relationships that emerge (1.1; 3.2; 4.2.8; 5.1.3; 5.1.3.2; 5.3)
Commencement & additional data source (2.4; 2.5; 3.5.2; 4.2; 4.3.1; 5.3; 4.2.1)
#9: Data source still appropriate to inform analysis? (4.2.9, 4.3.1, 2.6, 5.3)
No
Yes
#10: Collection, analysis, comparison cycles; question developing theory
#11: Was sufficient data sampled for concepts to emerge? (2.6.2; 4.2; 4.3; fig 4.1; 5.1.2; 5.4)
No
Yes
#12: Does development in analysis cycle still address research question? Z(2.6.2.4; 2.6.2.5; 4.2.6; 4.2.7; 5.3.2)
No
Yes
#13: Does the need exist to delimited the research field further?
Yes
No
#14: Is model and data categories saturated/ fully developed to explain ROP phenomenon? (4.2.9; 4.3.1; 2.6; 2.7; 5.1.3)
No
Yes
#15: Theoretical model on the dynamics of effective publication of research findings (ROP)

6.3 An overview of the empirical results and theory development



Data sources

Section 6.2 outlined the sequence of research arguments linked to empirical research execution. This section, Section 6.3, briefly relates the crux of the research findings and theory on ROP that evolved over cycles of data collection, analysis and comparison. Findings in these cycles were mainly derived from reviewed literature-; responses to an open-ended questionnaire-; and responses to a closed-ended questionnaire data sources. (Other data sources were also sampled, although to a lesser extent, e.g. field notes).

The nature of deductions derived from the different data sources: theory progression

These findings (presented in subsection 6.3.1 to 6.3.3) explain how the initial data source (the literature in an initial literature review) succeeded in identifying conceptualisations and also in naming these concepts as potential categories and subcategories[115] of ROP. Interim research – based mainly on an open-ended questionnaire data source – refined and described the suggested preliminary ROP categories and dimensions identified in the initial analysis cycles, and also provisionally identified the core category of the theoretical model of ROP. Findings at this stage also subtly suggested relational links between and within categories.

Section 6.3.3 summarises the findings of analysis cycles of responses to a closed-ended questionnaire (at this stage research is delimited to the researcher environment). Findings in these

[115] Sub-categories are also referred to as 'dimensions' of GT categories.

cycles illustrate how the focus of deductions moved to the quantification and verification of identified ROP categories and the quantification of relationships between ROP categories. This subsection briefly indicates how the categories and relational links between categories are integrated into a theoretical model that explains ROP. In this way the dynamics of ROP - as perceived from the vantage point of research support statisticians - are explained.

Refined research questions

As mentioned in Section 6.1.1 and true to GT methodology, research questions, sub-questions and topics evolve and were adjusted as research became more informed and theory developed. Sections 6.3.1 to 6.3.3 indicate how research questions and sub-questions were addressed in initial-, interim- and advanced phases of the research. It will be observed that the summary (and sequence) of analysis findings presented below corresponds with the argument line diagrammed in the "A" section of Figures 6.1. Furthermore, diagrams of theory development included in Chapters 4 and 5 are integrated in the results discussion to visually remind the reader of prominent results of theory progression.

6.3.1 Literature review data source

6.3.1.1 Operational planning

Prior to empirical commencement of research execution, it had to be determined whether the literature that served as commencement phase data source in this study complied with classic GT principles (Chapters 3, section 3.5.6; and 4, sections 4.2 and 4.2.1 refer). In addition, operational actions were developed and implemented in these analysis cycles. These include:,

- a coding protocol for data events[116] sourced from the literature;
- a framework (electronic database) for the electronic capturing of data events that, aside from a field for the data event itself, also included data fields for progressively more conceptualised code-levels awarded to each data event. The electronic framework also included fields to identify literature reference to each data event;
- an analysis strategy for the commencement analysis cycles that would allow comparison of coded data events, and comparison of more recently sourced data incidents/ code against previously sourced and coded data incidents. The purpose being to enrich conceptualisations that would ultimately point to ROP categories.

An overview of the results of these analysis cycles – referred to as *initial findings* - is reported in the next section and illustrates that provisional theory on ROP could be developed by means of a GT approach.

6.3.1.2 An overview of findings derived from the Initial analysis cycles (the literature data source)

The essence of initial theory development from the literature data source includes the following:

- *Conceptualisations that evolved from open coding of data events*

The main finding of the commencement cycle was the crystallisation of conceptualisations from open code (for example, '*doing research*'; *writing skills, research-practice knowledge, the research process;* and *role players* involved in the research process). Initial analysis cycles gradually narrowed

[116] This refers to events of interest to, *the production of research and the publication thereof*- the research topic of the study

728 open code entries to approximately 57 concepts (Table 4.5, Chapter 4). Examples of conceptualisations include:
Attributes, biographical properties; career promotion/enhancement; departmental sphere; English proficiency; ethics; institutional impact; management; methodology; mathematical skills; peer reviewers; research environment; research process; research role players; research skills; research mindedness; team work; research resource centres; statistical literacy and awareness; statistician; researcher; subject specific knowledge (Table 4.5, Chapter 4)

- *Cohesion between subsets of concepts suggest categories or dimensions or properties*

*A*nalysis cycles gradually informed and densified conceptualisations until it became evident that concepts formed part of more comprehensive concepts identified as categories, with the lesser concepts often suggesting dimensions or attributes of the overarching concept or category. These include, for example, the aspects of *planning* research, practically *executing* research and *analysing collected* data residing under the greater concept of the *research process*. This attested to the emergence of ROP categories and, concomitantly, the appropriateness of the methodology of GT in developing theory on ROP. This process of discovery is graphically summarised in Chapter 4, Figures 4.2 to 4.4

- T*entative categories*

Table 4.29 of Chapter 4 lists conceptualisations that unfolded as provisional categories related to producing and publishing research (for example, knowledge components, role players, characteristics and attitudes of role players, resources required to do research and more).

- *Informal reference to relational links between and within categories*

Table 4.29 of Chapter 4 also includes a column for suggested links between and within categories. These tentative links were suggested by the consolidation of conceptualisations to provisional categories or dimensions. For example, a relational link is suggested between the working conditions of researchers (consolidated to a provisional *research climate* category), how academic researchers conduct their research (consolidated to an emerging *research process* category) and the eventual publication of research findings (ROP). In this instance, a type of direct dependency between *research climate* and the *research process* category is suggested and an indirect relationship between *research climate* and *ROP* is suggested[117]. These suggested relationships constitute the second crucial component of an emerging theoretical model on ROP.

- *A need for more in-depth knowledge on some issues of emerging categories*

In an attempt to identify, name and structure emerging categories it became clear that more information was required to clarify and structure specific concepts or categories. The emerging categories/concepts were not saturated and alternative data sources needed to be sourced for category or concept enrichment. For example, more insight was required to decide whether concepts such as *research experience, subject specific knowledge*, *statistical literacy, publication savvy* and research *literacy/ or knowledge* constitute an integrated *knowledge* category or whether respectively subject-*knowledge* and *experience and savvy* represented separate categories of *knowledge* and *experience*.

[117] These suggestions were confirmed or adjusted in more advanced analysis cycles.

- *Vantage point or position determines how producing and publishing research is perceived (which suggest an environment category)*

Insight gained from analysis revealed that perceptions of ROP are vantage point-dependent. Stated differently, perceptions on article publication are (often) dependent on the position or capacity that the person expressing an opinion serves in: be this a manager of an academic department who has to balance academic and teaching responsibilities; an executive of an academic institution concerned with recognition of the institution as a centre of research excellence; or a researching academic interested in availing new research knowledge to the research community. This finding seemed to suggest that different vantage points (or environments) impact on perceptions of ROP. Therefore, vantage point or capacity that a person serves in suggests as possible additional category of ROP theory. Vantage-point perceptions of ROP are visually illustrated in Figure 3.7 of Chapter 3. (Figure B, Appendix 6.2 serves as visual reminder of the vantage-point argument).

- *Collection of voluminous general data and delimitation of the substantive research field*

Insight gained from the analysis of collected data (the literature) in the commencement cycles of research revealed that knowledge gained tended to be general, not specific. Furthermore, the volume of data accessed in this way could become unmanageable (to capture and process electronically). This raised the question of the relevance of massive amounts of general information captured over a broad spectrum of the research field. To illustrate this issue the example of the vantage point of an executive manager[118] on ROP is used: besides an interest in published research (that forms part of the academic research division of the institution), executives of universities deal with other institutional realities that include sound financial management; student enrolment and registration; HR administration and staff appointment; production and distribution of student materials; students on-line systems; an electronic knowledge system (library) and institutional research, to name a few. Views on research production and publication in this instance might be limited to the number of published articles per annum that earn research subsidy for the university and on incentives to drive up publication rate – issues which are far removed from the perceptions of academic researchers as to what research production and publication imply. The academic researcher is deeply involved in the research field where he/she generates research ideas, and works through the entire research process up to the point where research is published. More detail on the issues that hinder or boost research production and publication, therefore, will be collected from the academic researcher than from the executive manager. This type of nuanced knowledge will enrich the theoretical model of the study illustrating the argument that perceptions regarding ROP are vantage-point dependent.

6.3.1.3 Responding to the initial research questions

The summary of research findings of the commencement cycles of GT implementation presented in Section 6.3.1.2 describes elements and components of a developing theory. The property of GT that made this methodology an attractive option for the study was the theory-developing capability of the method (Glaser 2002:1-4). Therefore the building blocks of a theory reported in the initial analysis cycles of this study confirmed that the method was appropriate for this study and answered the question of how and whether theory on ROP could be developed (by means of the GTM). This

[118] Research voices reflected in the literature – the commencement phase data source – could be that of an HEI executive manager if the author of an accessed article was a HEI executive.

issue received attention in Chapter 3, Section 3.2.l and applicability was practically illustrated in initial GT implementation in Chapter 4.

6.3.1.4 A visual presentation of theory development in the commencement phase of research

Chapters 4 and 5 provide visual presentations of theory development that is summarised in Section 6.3.1.2. These visualisations show how a host of emerging conceptualisations (Figure 4.2 Chapter 4) gradually cluster together to suggest preliminary categories and or dimensions of categories (Figure 4.3, Chapter 4). Further development from continued analysis cycles gradually distinguished between different types of categories (Figure 4.4, Chapter 4). At this stage development subtly suggested that distinction was based on different relationships between and within categories. Appendix 6.2 of this chapter, Figure A, presents a visual reminder.

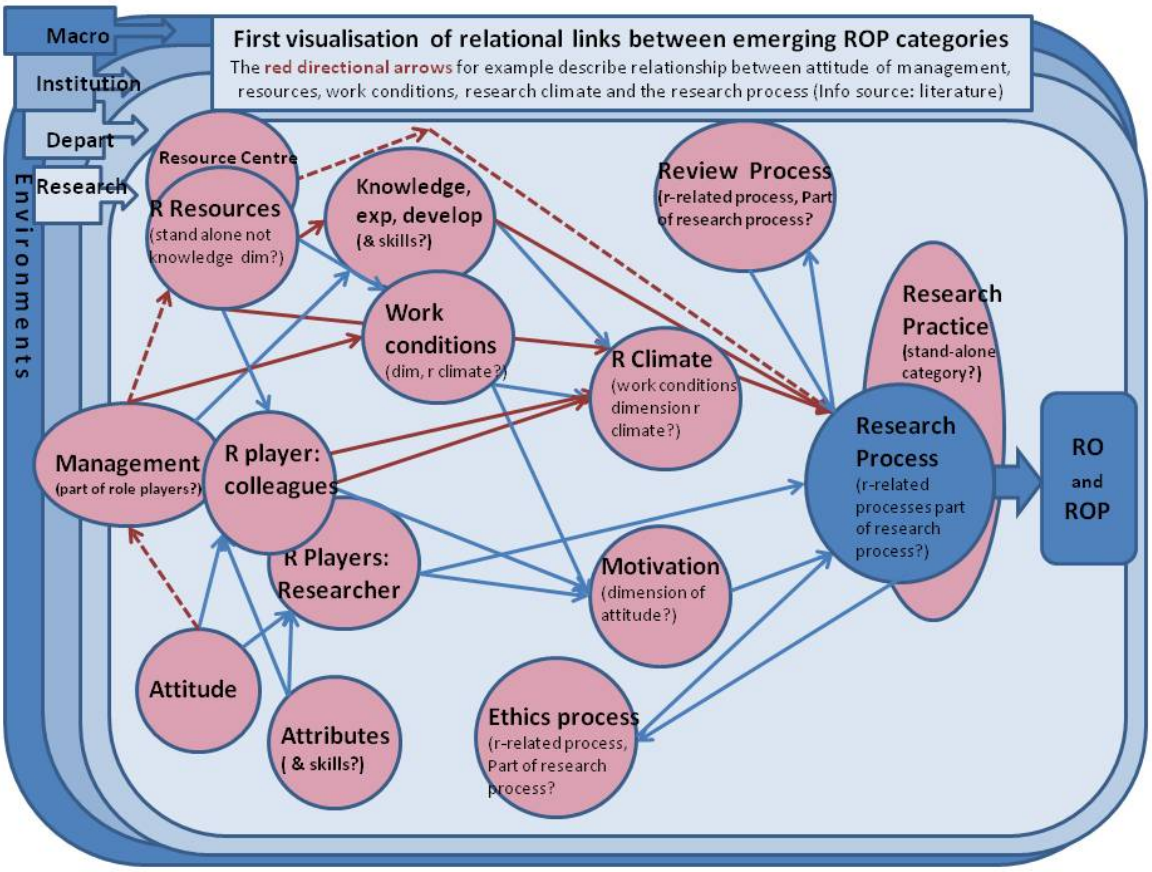
A category and relationship of particular interest to the researcher at that stage[119] was *environment.* This category was also of importance to the visual presentation of a more integrated, preliminary model of ROP presented in Figure 6.2 below. The following argument explains the interest: e*nvironment* seemed to form an underlying category (relationship) to other emerging ROP categories*.* Research reasoned that the dimensions of a provisional *environment* category represent, governmental, institutional, departmental and researcher facets or layers of society - each with a 'voice'[120] that reflects viewpoints on, for example, research and publication. These viewpoints are dependent on the interests and concerns that each dimension has with research and publication. Therefore, vantage point or sub-environment affects how research and publication are perceived. Research argued that developing theory in continued research would be best informed by interest groups closest to the research process and article publication This being so, Collecting data from these interest groups in continued research would effectively inform the research and promote theory development. *Environment* therefore suggested as an attractive research delimiter to be seriously considered in further analysis cycles.

This reasoning implies that a visual presentation of a preliminary model of ROP should therefore also accommodate the suggested underlying effect of *environment* to other emerging categories of ROP. Figure 6.2 visualises such an integrated provisional model of ROP with the dimensions of *environment* that underlie the tentatively identified categories of *research resources, knowledge, working conditions, role players, attitude, attributes and skills, motivation, research climate,* and the *research-, publishing- and ethical review processes*. This figure, for example, suggests four environment dimensions: the global/ governmental or macro environment; the institutional environment (HEIs); the departmental environment; and the researcher environment. The directional arrows indicate suggested relationships (as do the placement of constructs/categories that are positioned to overlap).

[119] Research field delimitation became a concern of the study.
[120] A 'voice' is regarded as an opinion expressed in literature that was sourced in the commencement cycle of this research (literature data source).

Figure 6.2: a diagrammatic explanation of ROP theory development

(indicating various environments/ or vantage point perspectives)



The next section, Section 6.3.2, briefly recaps the argument of continued analysis cycles in verifying the relevance of *environment* as a category of ROP theory and how responses to an open-ended questionnaire served as additional data source that informed further theory refinement.

6.3.2 The open-ended questionnaire data source

6.3.2.1 Operational planning

Although a preliminary model of ROP could be established with the information collected and analysed from the literature (presented in Figure 6.2), this research argues that the model did not present a saturated model of the phenomenon. More information was still required to clarify areas of uncertainty and inform specific issues asked of the developing theory. The research suggested at this point that, apart from the literature, a supplementary data source was required to effectively provide a detailed theory of ROP.

In continued research consideration should be given to the selection of a data source based on the need to answer specific issues and explain uncertainties. This would best be achieved by directing further data collection and analysis cycles away from existing literature to people directly involved in 'doing research'. How data was to be collected from this source should also be finalised.

Issues and research delimitation

Areas of uncertainty and questions asked of developing theory were listed in Chapter 4, section 4.4.1, and, for example, concerned how the concepts of 'doing research', *research practice* and the *research process* should be understood and structured; how the connection between the concepts of researcher *skills, abilities, attributes, competencies* and *capabilitie*s should be classified; whether *research resource centres* and *research resources* constitute a single category; what the position of *role players* in relation to the concept of the *research process* category should be; and, linked to this issue, the connection between the concepts of *management, environment, managers* and *role players* in research. A very important consideration at this point concerned the verification of *environment (*reflected in the vantage point of research voices in the literature) as a category of ROP theory. The research suggested that the research field could not be delimited to the *researcher environment* (to explain ROP more accurately) without verifying that e*nvironment* does in fact constitute a category of developing theory. The environment issue therefore had to be clarified in further analysis cycles.

Collecting data from the chosen additional data source

The fact that specific questions were asked of emerging theory confirmed that *theoretical sampling* would be a viable means of collecting information on these specific issues. Information on these issues could be collected as responses to an open-ended questionnaire[121]. Motivation for an open-ended questionnaire lay in the opportunities that a questionnaire would offer to collect information[122] from people with an interest in research but who serve research in different capacities[123]. In this way, apart from enriching theory development, the research would be able to indicate that the vantage point of a research participant (thus environment) affects perceptions of doing- and publishing research. This in turn, would verify *environment* as a category of ROP theory. An open-ended questionnaire was duly designed and administered to managers of departments, academic researchers and co-researchers, research support statisticians and editors of academic journals.

5.1.1.1 An overview of findings derived from the interim analysis cycles (open-ended questionnaire responses)

Findings deduced from cycles of analysis of open-ended questionnaire responses centred mainly on the structuring and clarification of ROP category description. Highlights of these findings include:

- *The identification of nine preliminary ROP categories*

These included the *attitude of researchers* towards research*; attributes and skills* of researchers*; the knowledge* of researchers (experience, development and specific knowledge*); the research climate* in which academic researchers function (work conditions, colleagues, managers)*; research related processes* that include *ethical clearance* of research*, peer review* of submitted articles and the *research process; research practice; research role-players; and research resources (and resource centres).* Table 5.1 in Chapter 5 refers.

[121] A questionnaire still to be designed that would probe issues queried and areas of uncertainty
[122] Such information will inform issues that need clarification.
[123] These capacities represent different environments.

- *Verification of an environment category*

Findings indicated that an *environment category* is relevant and applicable to the investigation of research output productivity. This forms the ninth preliminary category of ROP.

- *Research delimiter*

This finding suggested that *environment* and, more specifically, the dimension of the *researcher environment,* be used as a delimiter of the substantive research field in continued research in this study.

- *Suggestions that the research process category acts as the core category of ROP theory*

Responses to questions in the open-ended questionnaire strongly supported data events from the literature that the *research process* category plays a central role in the dynamics of ROP. Findings indicate that the *research process* links to all other categories: a characteristic of a core category in GTM.

- *An separate role players category*

Responses to questions in the open-ended questionnaire indicated that the impact and dynamics of *role players* on the production and publication of research were complex and should not be viewed as a dimension of the *research process* category but rather as a separate concept. This stance would ease the explanation of interactions between and within ROP categories.

- *Identification of different types of relationships between and within categories*

Analysis results suggested that categories stand in different relationships to one another. For example *environment* seems to exhibit an underlying relationship with other categories (including ROP as such) whereas other relationships suggest direct or indirect effect or one-on-one types of relationships, for example, peer-reviewers directly affect the *write-up and submission* dimension of the *research process category.* The *work conditions* dimension of the *research climate* category in contrast seem to indirectly affect *attitude*, the *research process*, the *ethical process, knowledge,* and the like.

The results at this stage indicated that GT analysis served to consolidate ROP concepts to ten preliminary identified categories. This pointed to a reduction of the dimensionality of the ROP model[124] which speaks to theory development. These results clarified specific areas of uncertainty and addressed issues asked of developing theory.

6.3.2.2 Answering to research questions

The research question in the interim phase of research asked:

> *Viewed from the perspective of a research support statistician in the research process, how do factors and/or events related to and within the research process affect research output productivity?*

Implied in this question are the issues of (i) the role of the *research process* in ROP theory development; (ii) factors and events that impact on ROP; and (iii) the suitability of the GTM to develop a theoretical explanation of ROP.

As reported in the results summary of Section 6.3.2.1, the interim findings point to the central position of the *research process* in producing and publishing research: the execution and write-up of research, that is, the *research process,* is crucial to effectively publishing research. This finding

[124] A characteristic of GT methodology is the reduction of the dimensionality of the theoretical model towards the advanced stages of theory development.

established the importance of the *research process* category. Furthermore, with respect to impacting factors and events, the research argued that preliminary identified categories of developing theory represent the factors and events that impact on ROP. These events include *attitude; attributes and skills; role-players; research resources; knowledge; the research process; research climate; research practice; and environment.* In the last instance it is suggested that the fact that interim analysis cycles succeeded in clarifying and refining issues of emerging theory attests to the suitability of GTM to develop theory on ROP. The emerging structured understanding of the process of producing and publishing research – although still incomplete at this stage[125] - starts to explain the dynamics of the ROP phenomenon.

However, new questions were still being asked of interim theory development which indicated that the theoretical model of ROP was not saturated and that specific additional information was still required to explain research output productivity more fully. Section 6.3.3 briefly discusses the additional issues; how a new data source was decided on and how new information culminated in the final refinement of a theoretical model for ROP.

6.3.3 Closed ended questionnaire data source

Figure 6.3**,** compared to Figure 6.2 **(**repeated in this section) below, illustrates progression in theory development from the concluding literature analysis cycles to the concluding cycles of the open-ended questionnaire data source. The absence of the different layers of the *environment* category in Figure 6.3 illustrates the suggestion that environment serves as a delimiter of the research field in continued analysis cycles. The concepts more prominently outlined in Figure 6.3 (compared to Figure 6.2) show the preliminary identified categories of ROP. The other concepts in Figure 6.3 - still colour-coded according to Figure 6.2 convention - show areas of uncertainty that still require attention (for example, colleagues, co-researchers, researchers and support statisticians resort under the *role-players* category, but uncertainty still exist whether managers form a dimension of the *role player* category or whether managers should report under the management function of managers).

6.3.3.1 Operational planning

Chapter 5 describes how further questions asked of more recently developed theory were structured into areas of concern (Table 5.2 of Chapter 5). The research argued that information on these concern areas could be sourced by means of a closed-ended questionnaire. The structured concern areas could serve as a framework for the design of this questionnaire. Furthermore, to delimit the research field to the suggested *researcher environment*, information (via the questionnaires) could be collected from people directly involved in research, namely academic researchers, co-researchers, and research support statisticians with direct involvement in the *research process*. Research argued that theoretical sampling would still apply since more information on specific issues from a specific type of research participant was required. In this way delimitation of the research field, the choice of an appropriate additional data source and how information should be sourced from the data source were addressed.

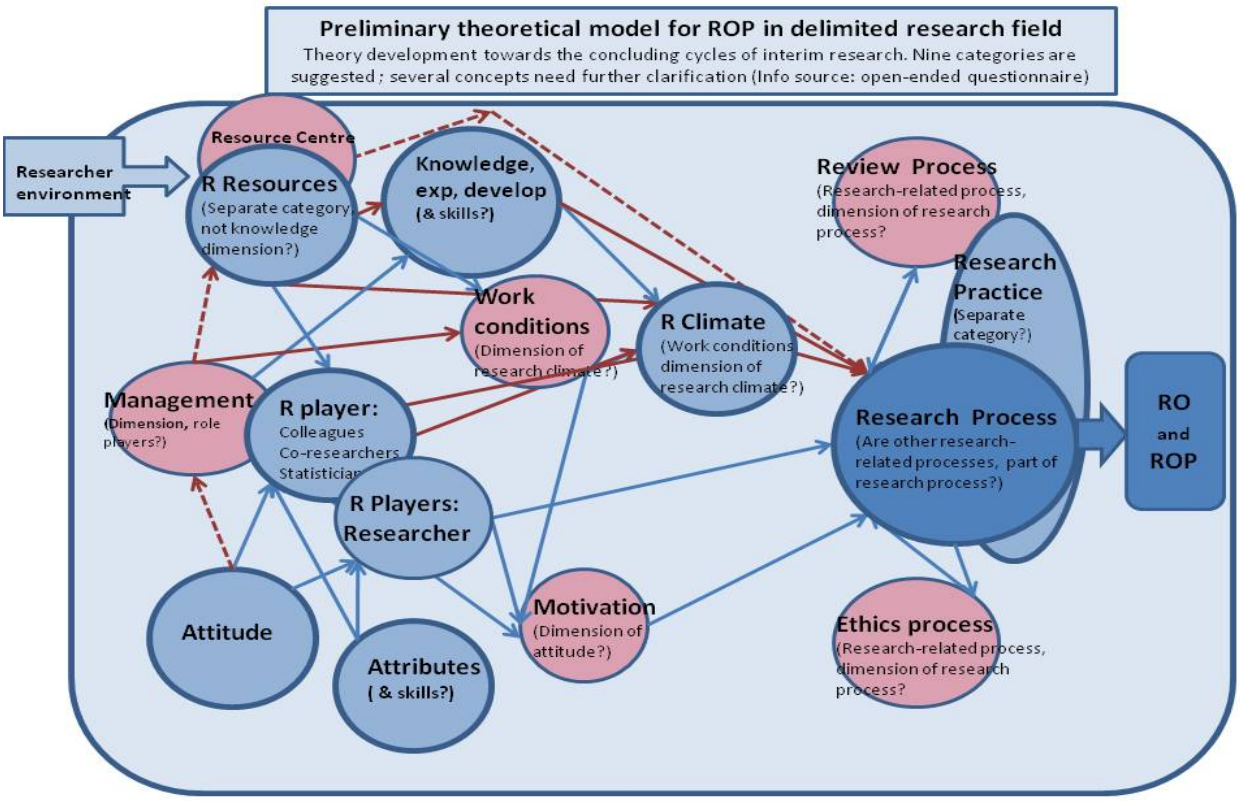
[125] Chapter 5 indicates that additional aspects of developing theory required clarification towards the concluding cycles of interim research.

The research argued that a custom-designed closed-ended questionnaire would not only allow the researcher to collect information on specifically identified issues and areas of uncertainty from a delimited researcher environment but also serve to quantitatively measure researcher perceptions of aspects of developing theory. Such responses would allow the quantification of relationships between and within categories (e.g. *knowledge, skills and attributes; attitude*) and between categories and the *research process,* the core category of ROP theory. It is suggested that by quantitatively explaining relationships, an in-depth explanation of the dynamics of ROP could be achieved.

Since interim analysis cycles clarified many of the issues relating to category-definition and structuring, investigation in the advanced analysis cycles (summarised in the remainder of this section) aimed to verify the explanation of these categories and furthermore focus on refinement of relationships between and within categories. The focus on explaining relationships was regarded as critical since relational links serve as the second building block of theory development (apart from category identification) and is therefore essential to modelling the phenomenon of ROP.

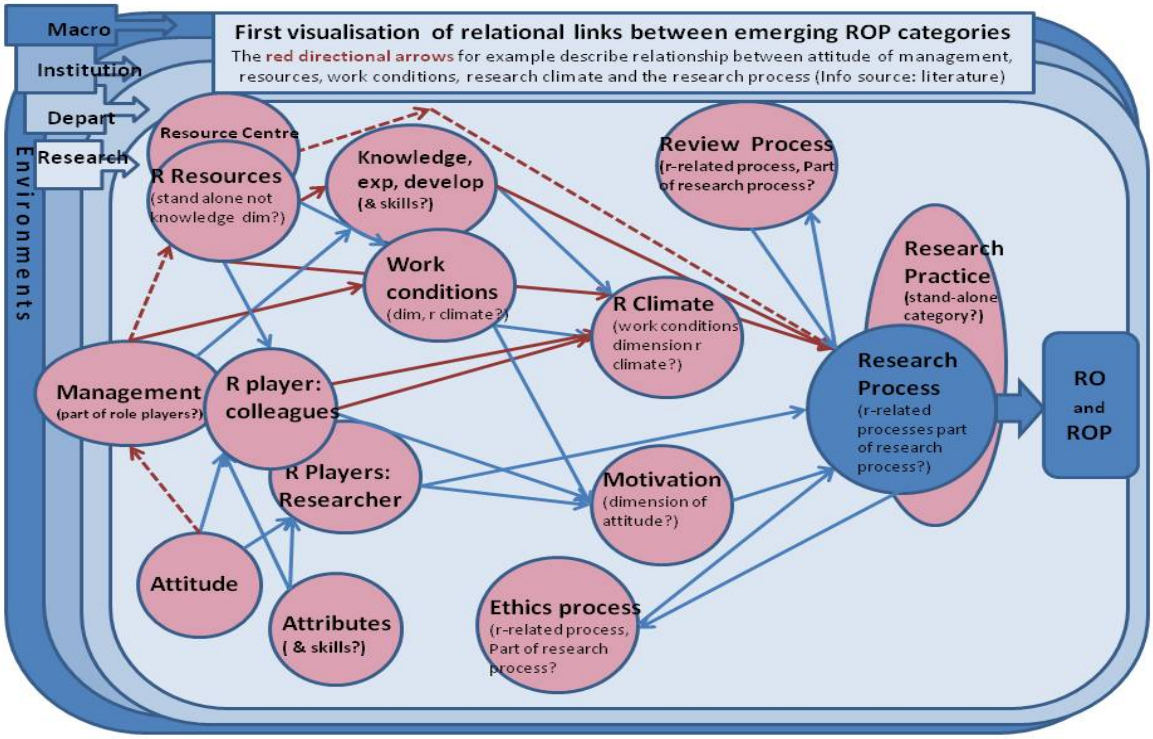
Section 5.2 of Chapter 5 discusses questionnaire design, participant selection and questionnaire administration. Section 5.3 reports on analysis findings and how newly acquired insight were integrated into the existing model of the dynamics of ROP. An overview of these findings is presented in Section 6.3.3.2 below.

Figure 6.3: The provisional theoretical model of ROP towards concluding cycles of open-ended questionnaire data source (Delimited to the *researcher* dimension of the *environmen*t category)



Colour legend: In Figure 6.3 the blue circles indicate the nine concepts identified as categories; the red/ pink circles indicate concepts that still require further investigation.

Figure 6.2 (repeated): Theory development towards concluding analysis cycles of literature data source



6.3.3.2 An overview of research findings derived from advanced cycles of analysis

- *Delimited researcher environment*

*The r*esearch succeeded in narrowing down the substantive research area by sourcing only responses from researchers and support statisticians in a closed-ended questionnaire. Findings indicate that in the delimited research field the relevance of some categories to the production and publication of research ROP become less relevant (e.g. *management* category).

- *Quantification of perceptions of ROP categories*

The format of the custom-designed closed-ended questionnaire enabled the researcher to quantitatively measure perceptions on six of the nine[126] categories that describe the final ROP model. Table 5.13 in Chapter 5 reports on academic researchers' perception of the relevance of these categories to the production of research output. The categories of *the research process; knowledge, attitude, research resources, role-players; and skills and attributes* could be quantitatively verified as categories of ROP. This was done by indicating that mean perception ratings on these concepts agreed with 'of relevance' ratings to the *research process* and publication of research (ROP). Table 5.1 in Chapter 5 defines these ROP categories.

- *Verification of the research process as core category of the ROP theoretical model*

For the quantified ROP categories, a correlation matrix calculated on the sets of perception scores of the *research process* category with the other ROP categories indicated statistically significant correlations with the scores of the *research process* category. This verified that the *research process* emerges as the core category of the theoretical model of ROP. With regard to the two categories that were not quantitatively measured, namely, *research practice and research climate,* Chapter 5 indicates[127] that dependency with the *research process* category could be qualitatively verified from the literature.

- *The direct relational link between the research process* as dependent variable and the categories of *knowledge;* and *skills and attributes of researchers (Table 5.20)*

The quantifiable linear relationship - derived from Table 5.20, Chapter 5, is described in the equation:

Research process = 1.72 + 0.41 x (*skills & attributes*) + 0.26x (*knowledge*) – 0.05 x (*type of researcher*) (Section 5.3.5.1. and Tables 5.20 and 5.23, Chapter 5)

The equation indicates that researcher knowledge; -skills and -attributes; and the type of researcher (experience & publishing skills) positively impact perceptions of the *research process* (and therefore ROP). This explains a critical component of the relational links that constitute the model of ROP.

Section 5.3.5.1 of Chapter 5 indicates how the expression can be interpreted for specific skills, knowledge and researcher-type levels:
For example it can be derived that that expert researchers (indicated as level '4' researcher-type), with a high regard for knowledge (indicated by a '4' Likert rating) and skills (indicated by a '4' Likert rating), value the research process (the 4.4 value of the regression equation, which is

[126] Quantification of *environment*, the 9th category of ROP theory was not deemed necessary since research was restricted to the researcher dimension of the environment category which underlies the other categories.
[127] Sections 5.3.3.5; 5.3.3.7; and 5.3.4.3 discuss the reasons why these two categories were not quantitatively evaluated and how it was qualitatively verified that these categories relate to the *research process* category.

rounded to a Likert rating value of '4')x:

Perception (*research process)* = 1.72 + 0.41x(4.0) + 0.26x(4.0) – 0.05x(1)
= 4.40,

while inexperienced researchers (category level '1') who do not perceive knowledge and skills as relevant to research (Likert rating score of '1') also exhibit less appreciation for the research process in research (for ROP)

Perception (*research process)* = 1.72 + 0.41x(1.0) + 0.26x(1.0) – 0.05x(4)
= 2.19

Indirect relationships between the research process and the categories of research resources, attitude, and role-players.

The fact that the two abovementioned categories of *skills and attributes* and *knowledge* (included in the regression equation) are positively and statistically significantly correlated with the categories of *research resources*, *attitude*, and *role players* implies that the last-mentioned three categories indirectly link to the *research process* (Table 5.19, Chapter 5).

More experienced researchers accept more responsibility for their role in the research process

Chapter 5 also explains that discriminant analysis – conducted on the perception measures of research participants indicated that *attitude* and *the research process* discriminate between more and less experienced researcher groups (Tables 5.21 and 5.22, Chapter 5). The findings indicate that the more experienced researchers scored higher on the *attitude* and *research process* categories.

The higher scores indicate that these researchers value a positive *attitude* towards research and the importance of the *research process*. *Attitude* focused on role and research responsibilities while the *research process* centred on the procedural steps of 'doing research'. This explains the statement that more experienced researchers accept responsibility for their involvement in research

The dynamics of the ROP phenomenon could thus be explained by means of a theoretical model of ROP

The significance of the reported deductions lies in the fact that the advanced analysis cycles detailed interaction between categories – in other words the dynamics that underlie the effective production and publication of research (as articles in accredited journals). Figure 6.4 below, compared to Figure 6.3 (copied from Section 6.3.3.1) illustrates theory progression in the advanced analysis cycles. The final model of ROP is presented in the concluding discussion of Section 6.4.1 (Figure 6.7).

Figure 6.4: A visualisation of the fully developed model of ROP in advanced analysis cycles (the closed-ended questionnaire data source)

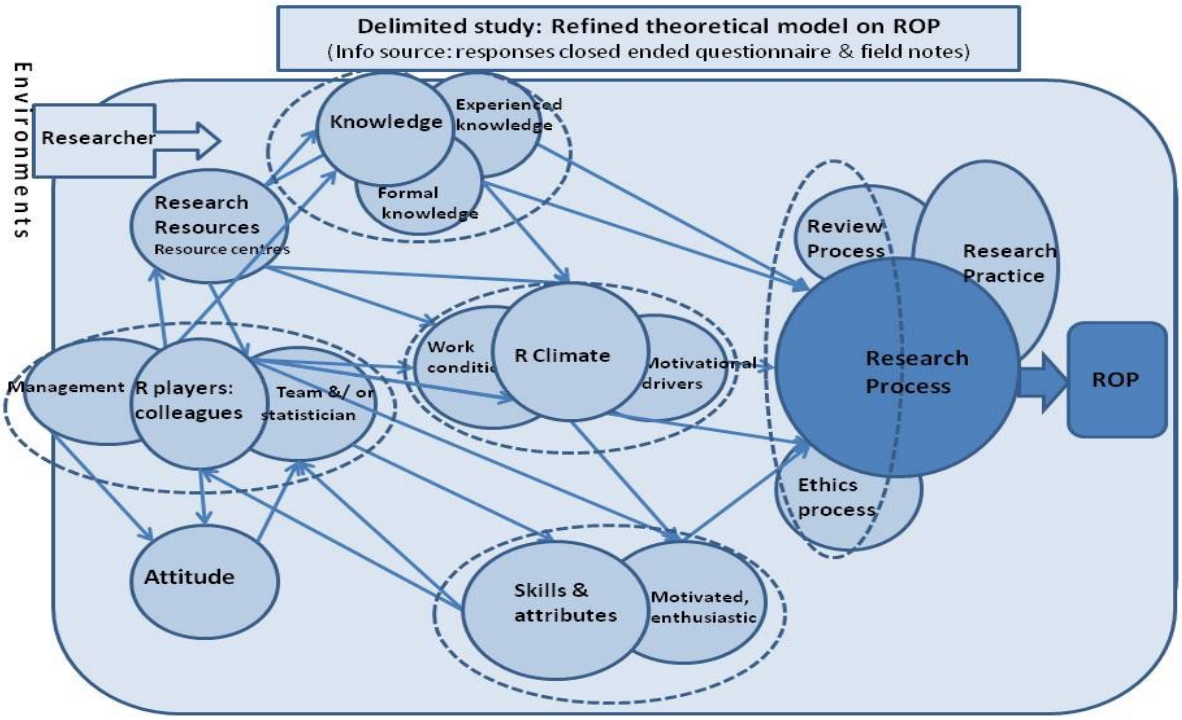
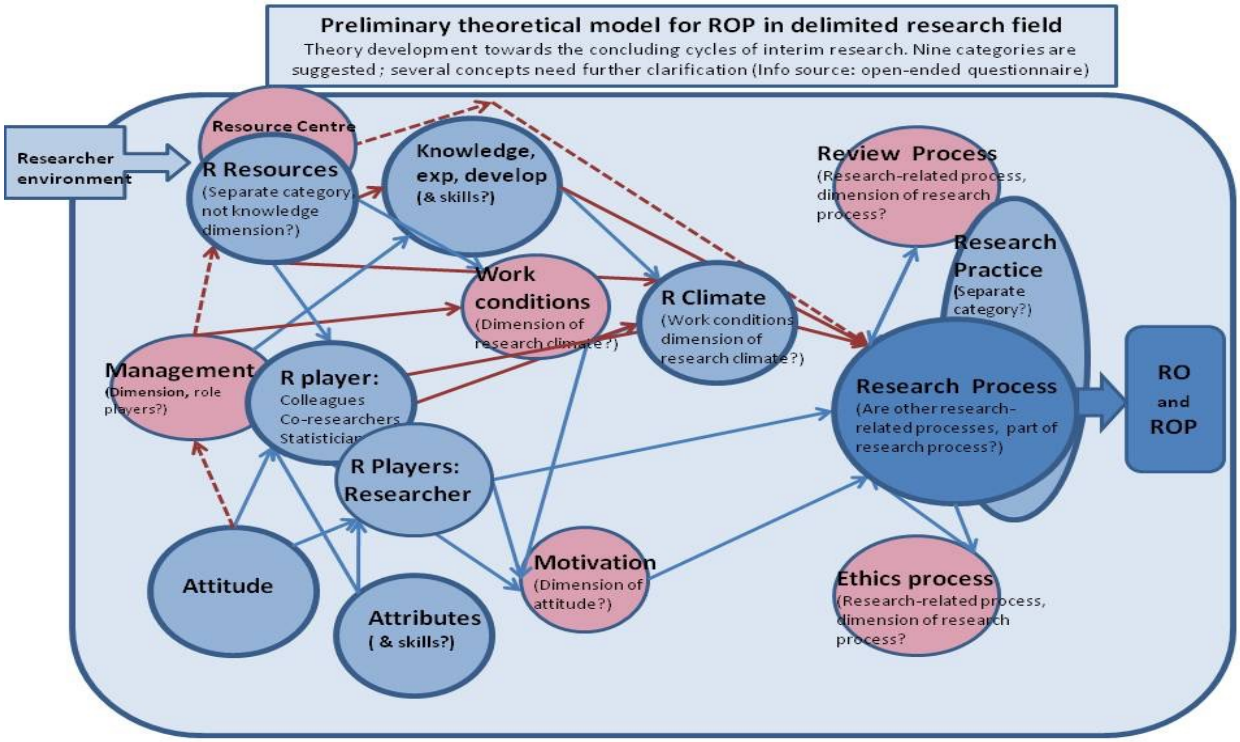


Figure 6.3 (replicated): The provisional theoretical model of ROP towards the concluding cycles of using the open-ended questionnaire data source



6.3.3.3 Answering the refined research questions of Chapter 5

The two refined research questions of the advanced research, namely:

What underlies the dynamics of ROP?

and

What is the nature of the dynamics of ROP?,

focused on the building blocks of ROP theory, namely, the basic concepts of the theory and the relationships between these concepts. The associated sub-research questions, listed in Section 6.1.1 of this chapter, queried specific details of categories and relationships. At this stage consideration was given to whether advanced analysis cycles succeeded in answering these research questions (and sub questions) and whether a sound explanation – viewed from the perspective of research support statisticians – was given of the dynamics that underlie research output productivity.

The summary of research findings in the three subsections, Sections 6.3.1 to 6.3.3, of this chapter clearly indicates how a theoretical model for ROP was developed around the building blocks of category identification (*What underlies the dynamics of ROP?)* and relationship-description (*What is the nature of the dynamics of ROP?*). The fact that research was narrowed down to the researcher's environment furthermore ensured that detailed information could be sourced at the level where research is executed and true know-how of doing research exists. This relevant information enriched the explanation of the research phenomenon. Furthermore, perception measures of the relevance of ROP categories answered the question of impacting factors and categories: if categories are perceived to be relevant to ROP it implies that they are perceived to be influential, which, in summary, indicates that the research succeeded in answering the research questions of the relevance of the factors to ROP.

The approach of GT to reconsider and rephrase research questions and sub-questions as theory development progressed, constantly re-routed research to the fundamental question of GT namely, 'what is the phenomenon about', and this served an invaluable role in staying focused on (and explaining) the phenomenon of producing research and effectively publishing research articles.

6.3.3.4 A visual display of theory development in advanced analysis cycles

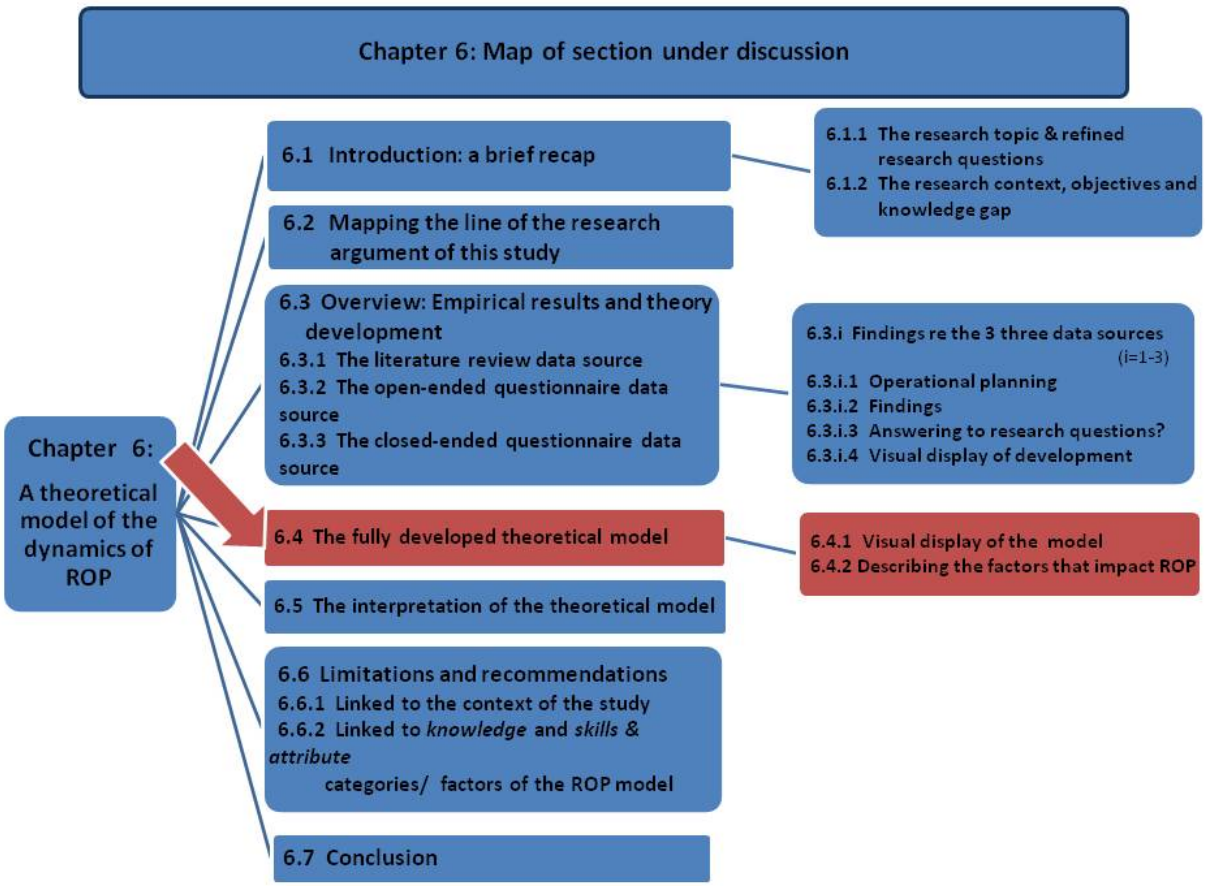
As mentioned in Section 6.3.3.2, Figure 6.4 compared to Figure 6.3 illustrates the final progression of theory development in advanced analysis. Figure 6.4 depicts the integration of several concepts that form the factors or events that impact on research output productivity (namely, *knowledge; research resources; role players; attitude; research climate; skills and attributes; article evaluation and the peer review process; research practice* and *the research process)*.

A point of consideration at this stage (regarding Figure 6.4) was the fact that the dynamics of these factors and their interaction with *the research process* and article publication was originally only indicated by means of arrows between categories whereas in the advanced cycles relationships are enriched by linear regression equations and discriminant functions (Section 6.3.3.2 refers). This suggests direct and indirect relationships between categories. However the display, Figure 6.4, fails to adequately illustrate the more detailed relationships within the *research process* category. The research argued that a more accurate picture of the dynamic interplay of effects in the model would require a third dimension – the effect of the researcher as such. Figure 6.5 visualises a more

accurate incorporation of the dimension of the researcher in the explanation of the dynamics of ROP.

In addition to the visual displays of the model in Figures 6.4 and 6.5, Table 6.1, presented below (adapted from Tables 5.1 and 4.29 of Chapters 4 and 5), defines the factors that, in conjunction with the regression and discriminant function equations, comprise the theoretical model of ROP.

6.4 The fully developed theoretical model on ROP

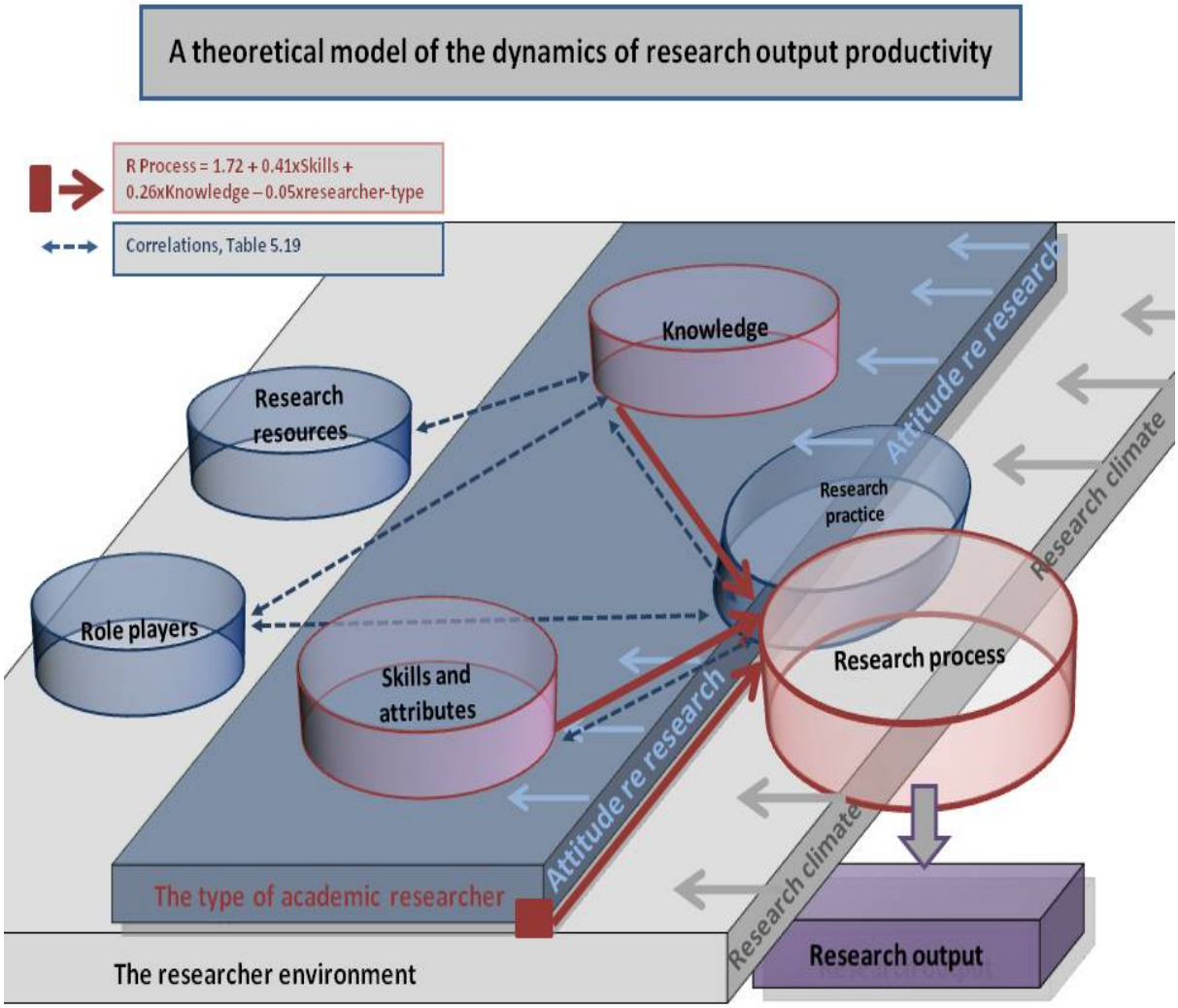


6.4.1 The inclusion of the researcher-dimension in model display

To illustrate as accurately as possible the impact of the *researcher-as-person* in the ROP model, a researcher dimension still had to be integrated in the model-visualisation of Figure 6.4. The question was how this should be accomplished. This issue fell into place when research argued that specific ROP categories (or impacting factors) are intrinsically interwoven with the *researcher-as-person.* These include the *knowledge* of the researcher*, skills and attributes* of the researcher*,* the *attitude of the researcher* towards 'doing research', and the researcher's unique *research practice.* By introducing the *researcher-as-person* as a type of underlying factor to certain categories of the ROP model, the visualisation of the enriched model fell into place. This additional *researcher-as-person* layer furthermore offered an opportunity to remind one – visually - of the quantitative analysis findings.

An integrated model of ROP is presented in Figure 6.5. An explanation of how impacting factors (categories) are understood in the context of this study is given in Table 6.1 which follows Figure 6.5. The details of relationships and links between categories have been elaborated on in Section 6.3.3.2.

Figure 6.5: The integrated model of ROP illustrating the researcher-as-person layer in the model
(This model accommodates the explanation of the quantitatively and qualitatively verified relationships between the core category and other categories of the research output phenomenon)



6.4.2 An explanation of ROP categories in the context of this study

The categories that form the building blocks of the dynamics of ROP are briefly described in Table 6.1. These definitions explain how factors and events that impact ROP - derived from GT analyses of data sources – are understood in the context of this study.

Table 6.1: Defining the categories of the fully developed theoretical model on ROP

A definition of categories, the dimensions of the categories and relational links between categories of ROP		
A brief definition of the ROP categories	**Category dimensions**	**Relational links**
Environment Environment refers to influence spheres that have an interest in and impact on research. Interest in research range from national and international concerns (and influence) regarding research policy, funding, research / teaching preferences, availing of research resources, to departmental and direct involvement of academic researchers 'doing research'. For example issues of international importance may direct research trends (fuel/ energy crisis); nationally policy might favour HIV/AIDS research; DHET may prescribe incentives for research funding policy; HODs lay down research/ teaching workloads; the international research community and publishers set publication-quality standards	**Dimensions** - Global/ government - Institutional - Departmental - Researcher & editorial environment	• The environment category and its dimensions form an underlying type of relationship in the production and publication of research. Environment dimensions are regarded as influence spheres that impact research in some way or other. Though environment dimensions may be differently labelled in other disciplines, (e.g. meso-, macro-, meta- in social sciences), in the context of this research influence spheres are that influence ROP include: government and international interest; institutional interest; departmental interest; and researcher and editorial/ or peer review interest • The researcher environment serves as delimiter of this study
Research-processes This research regards the research process as the procedural and generic set of execution steps associated with all research. This involves the formulation of research topic and -questions; planning en design of the research; research execution and data collection; data analysis and interpretation of analysis results; and research write-up and submission (and re-submission) to appropriate DHET accredited journals. The process includes ethical clearance of research and the peer review process (If research was not delimited to the researcher environment, the editorial review process could be considered a separate ROP category).	**Dimensions of** - Plan & design - Execute & collect (includes ethical clearance) - Analyse and interpret - Write & submit (includes peer review process) [Literature indicates that the research steps are labelled & grouped in various ways]	• *The research process* constitutes the core category of the ROP model and relates directly to, *i.* the four dimensions of the *research process* *ii.* the *knowledge* category *iii.* the *skills and attributes* category *iv.* the *role players* category *v. attitude* *vi.* the *research practice category & research climate (literature references)* And indirectly (via the *knowledge* category) to , i. *research resources*
Research practice Research practice refers to the unique ways each researcher practice research; how they approach the procedural steps of the research process. What they personally bring to the research process to plan, formulate, execute, collect, analyse, interpret, write-up and submit their research. This may involve how they develop research knowledgeability & experience (research networks, chat rooms, seminars, conferences, informal collegial communication); whether they prefer collaborative research (research teams or solo research); provide or accept mentorship; seek research experience via exposure to research (team member in prior research projects); adhere to professional & ethical conduct; have a preference for research; prefer qualitative, quantitative-, mixed methods approaches and more.	**Dimensions** *** Practice-styles** (personal way of doing) i. communication ii. networks /share iii. collaboration iv. teamwork/ solo research v. self-development & exposure vi. mentor/ mentee vii. research habits/use resources *** Research conduct** i. Professional ii. Ethical iii. Methodology preference iv. Research quality, integrity v. Abide to technique assumptions vi. Responsible/ regard for others	• *Research* practice interacts with i. the *research process (research practice* is applied throughout the generic steps of the *research process,* therefore categories that interact with the *research process* also interact with *research practice)* *ii. research role players* *iii. knowledge* *iv. Skills* *v. research resources*

Researcher skills and attributes Researcher skills and attributes refer to the personal research capabilities of researchers. Intrinsically and acquired that enable them to effectively do research. These include intrinsic properties such as an innovative and inquisitive disposition; logical and structured thought processes; the ability to persevere and complete; hard working, focused and motivated. The concept also include skills and knowledgeability: for example writing skills, English proficiency, organisational and social skills, research experience, qualification and more.	**Dimension: *capability types** i. Skills ii. Competencies, abilities (English proficiency; writing skills, experience, knowledgeable) ii. Biographical traits (e.g. motivated ; work habits meticulous, persevere, analytical) iii. Academic qualifications/ experience.	• *Skills and Attributes interact directly with,.* *i. the research process* *ii. knowledge* *iii. attitude* *iv. research practice* *v. role players* *[Motivated mind set an element of skills/ attributes category but motivational drivers (e.g. promotion) resorts under research climate category]*

Researcher attitude The researcher's attitude towards research covers different dimensions. These dimensions jointly act as driving force in effectively publishing research. For example the element of researcher role responsibility forms an important dimension of attitude. Regard for and acknowledgement of other research role players' talents, knowledge and contribution to a research endeavour also resort under this category. Research attitude appreciates the role of knowledge: subject specific-; research and methodological savvy and experience; and statistical awareness and –literacy. Awareness of knowledge needs results in appreciation for research resources and services. A positive research attitude involves the mindset (motivation) to deliver ethical, reliable, quality research that contributes towards the quality and advancement of scientific research.	**Dimension, of** ***Attitude towards:** a. role responsibilities within -- research process -- team context -- research practice b. role players/ team members c. knowledge & savvy --subject specific -- research experience & savvy -- statistical knowledge -- knowledge development d. research resources/ centres e. personal research values, -- research integrity -- ethical conduct -- value/relevance research f. research practice g. research process h. motivational mindset	• *Attitude* correlates with i. the type of researcher (The attitude of the effective researcher distinguishes him/ or her from less productive researchers*)* ii. the research process, iii. role players iv. skills and attributes v. research practice
Knowledge A solid knowledge base is required to do research. Knowledge has various dimensions which include subject specific knowledge (what is known/ what has to be investigated); research knowledge (how to do research, e.g. research designs & research methodology); statistical literacy; publication knowledge (how research submission and article writing should be approached); research experience and publication savvy. Knowledge development also resorts under the knowledge concepts. Knowledge development ensures that a researcher remains up to date with subject specific research, development and creates sensitivity to identify knowledge gaps for further research and insight to interpret and integrate new knowledge in his/ her specific research field.	**Dimensions** • **Knowledge-types** i. Formal knowledge (subject specific-, research practice, statistical knowledge) ii. Experience (research & publication savvy) iii. Knowledge development, access to knowledge (training, exposure/conferences, info sources)	• *Knowledge* interacts directly with i. the *research process* *ii. role players* *iii. research resources* *iv. skills and attributes* *(*knowledge-ability, dimension of *skills and attributes, but knowledge to become knowledgeable, is part of the knowledge* category) And indirectly with *i. the peer review process* *ii. research practice*
Research Resources, Research resources describe the type of support that avails physical, intellectual and emotional resources to researchers that enable them to plan, execute, analyse and publish their research. A critical component of research resources comprises a research infrastructure to administer, fund, direct, support, develop, connect, inform and support research. A second important component involves physical research support (Research Resource Centre) in terms of accessible knowledge, development, mentors, technical– and statistical support	• **Types of resources** i. Research infrastructure - research policy - human resources capacity - research administration - financial structure & system - IT connectivity/ network - knowledge: internet/ library ii. Physical research support - research resource centres - access to colleagues/ mentors	• The category Interacts with i. attitude ii. knowledge iii. skills & attributes And indirectly with i. the research process ii. role players iii. research climate

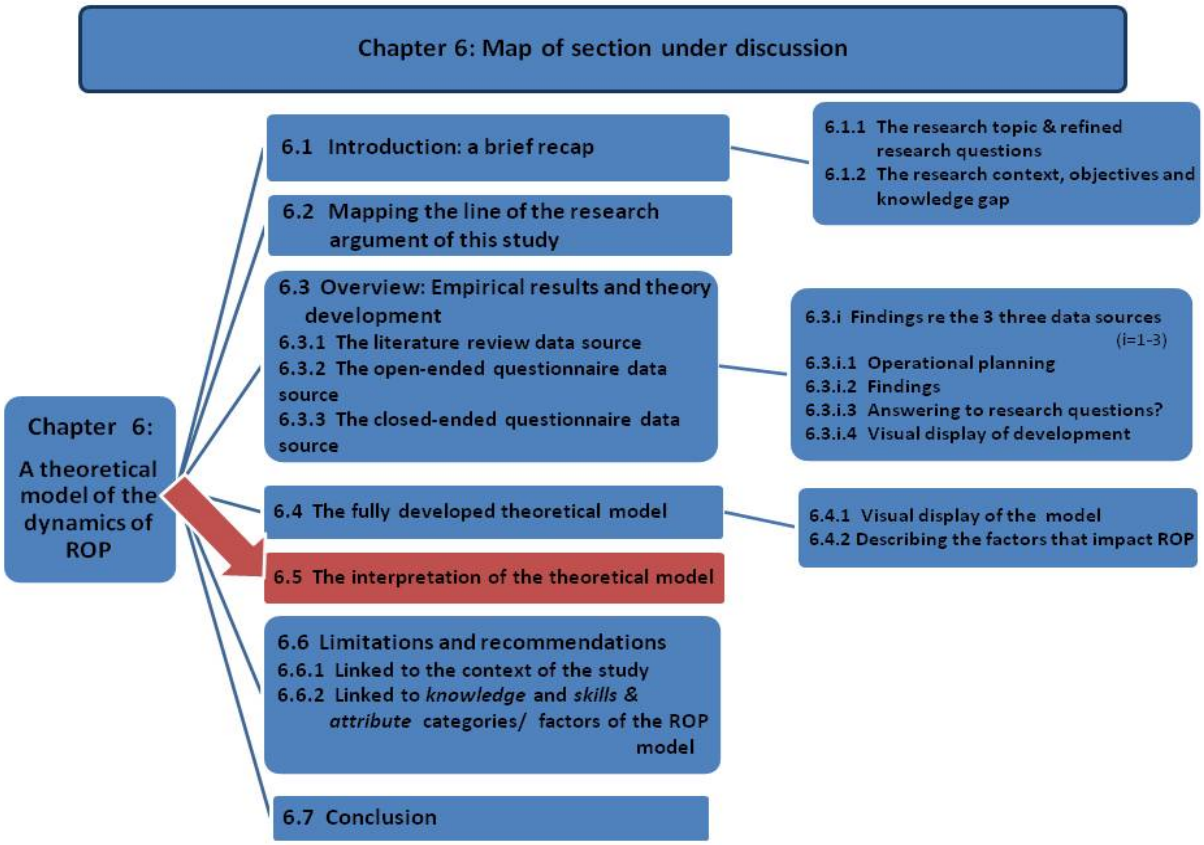
and other physical research resources (e.g. software).	- development/ training -research exposure, resource	

Role players Role players refer to research interest groups and individuals that impact the research process, the researcher environment, research practice, and the publication of research. Role players include research team members & co-researchers; colleagues; managers and institutional executive; research support staff (e.g. statisticians, IT specialists); and journal peer reviewers and editors. People/parties that facilitate human resource allocation, funding, research policy, a supportive environment, access to knowledge, to communication and network access, and more required throughout research execution and article submission.	• **Role player dimensions** a. Impact dimension: - internal to researcher environment - external, researcher environment b. Type of role players - executive, managers, HR - colleagues & mentor - co-researchers/team - statisticians, - editors, peer reviewers c. Role responsibility dimension d. Role characteristics dimension	• *Role player* category interacts directly with i. research process; ii. knowledge; iii. skills & attributes of the researcher And as indicated in the literature with i. research climate; ii. research practice iii. article evaluation & review process

Research Climate Research climate refers to working environment and conditions in which the researcher conducts research. Dimensions include, human resources research capacity; supportive research administration; discipline specific department; research time; research/ teaching load of staff; research mindedness of colleagues and managers; departmental research expertise; a research supportive and research-stimulating departmental atmosphere; institutional research preference and policy; service conditions linked to research output incentives, e.g. promotion & financial reward; opportunities and exposure to research and research experts; the research status of the institution and more.	**Dimensions** **a.** Research **supportive atmosphere** (research awareness, research priority, policy, human capacity, willingness to share expert knowledge) b. **research exposure** (expert colleagues as role models, c. **research orientated** management, Colleagues, team members (example of peers, mentors, etc.) - expectations/ motivators (IPMS criteria, rewards, incentives, academic recognition) - departmental work/ time allocation, research autonomy, work load, etc.). Work conditions resort under research climate category not under research resources category	• Research climate interacts with i. the research process ii. research resources iii. other environment-dimensions iv. role players v. attitude vi. knowledge, experience

The academic researcher as person Advanced analysis cycles indicated to the relevance a researcher's publication and research experience to researching and publishing effectively. Research suggested that certain ROP categories are part and parcel of the researcher as person: *knowledge, attitude, skills and attributes, and research practice*. These categories stand in a different relation to the researcher as is the case with the categories of *research resources, research climate, role players*, and the research process. The researcher-as-person adds another layer to the ROP model.	The researcher as person underlies the categories of i. knowledge ii. skills and attributes iii. research practice	• In this study the researcher-as-person was grouped into four classes according to research- and publication experience. This classification links the (i) knowledge category to the researcher. Discriminant analysis also indicates to the dependency between researcher type, (ii) attitude and the (iii) research process.

6.5 The interpretation of the theoretical model of ROP



Interpretation of the ROP model from the vantage point of the research support statistician

Viewed from the perspective of research support statisticians who are directly involved in research, the model indicates that the *research process* is the central activity in the publication of research findings in academic journals. How effectively this central activity is executed - and research findings published - is affected by a number of factors. These include:

- Various forms of specialized knowledge
- Research-related skills and attributes of researchers
- Other role-players involved in the research endeavour
- The research environment and work conditions (the research climate) of academic researchers
- The availability and utilisation of research resources and research support services
- Researchers' personal way of approaching research – their specific research practice, and,
- The attitude and acceptance of role responsibilities of academic researchers.

These factors are interrelated and therefore their dynamic interplay jointly affects how effectively research is published in academic journals.

In the final analysis cycles a very important and subtle dimension impressed itself on the theory of ROP: the *researcher-as-person*. It was indicated that research and publication efficacy of researchers[128] corresponds with a responsible *attitude* towards research and research execution (the research process). Furthermore, the researcher's subject, research and statistical *knowledge,* as

[128] Spearman's correlation coefficient for the pair-wise set of *researcher-type* and *attitude* scores for this research was calculated as 0.40 (on the 5% significance level).

well as *skills and attributes,* directly affect the *research process*. The other ROP[129] factors impact on the *research process indirectly* because of their interrelatedness with *knowledge* and with the *skills and attributes* of researchers. These other factors include how researchers personally practise research (*research practice),* other *role-players* involved in the research endeavour, the *research climate* in which academic researcher work, the availability of and type of *research resources* at the disposal of the researcher and, integrated in the *research process,* article evaluation in the *peer review* process.

The model therefore strongly suggests that factors exist that impact on ROP but that the researcher dimension is of great significance in this situation. Factors that impact on ROP in this way include a responsible research attitude; meticulous research execution (the research process); subject-, research- and statistical knowledge; and research-related skills and attributes of researchers. These factors all link inextricably with the researcher and explain the impact on ROP more completely. The plausibility of this explanation rests to a great extent on personal observation and experience[130]of research support statisticians engaged in the research projects of academic researchers.

The trustworthiness of the developed theory evaluated against GT quality criteria and the natural history or life story of research and researcher

Section 3.7, p138-140 dealt with the quality, or trustworthiness of developed theory, where trustworthiness of the research concerns the issue of whether 'the story expressed in the theory is a true explanation of the research phenomenon (not a fabrication) that is good and interesting, useful, applicable in practice and realistic' (Adolph et al 2011: 506-509). This current section evaluates the trustworthiness of the theoretical model of ROP developed in this research. In short the developed theory explains ROP in terms of

> *the dynamical interaction between the researcher in a research environment where other role players, research resources, skills and attributes of the researcher, the knowledge of the researcher and role players, the research practice of the researcher, as well as the research climate where the researcher and role players work. Favourable conditions and interaction impact positively on the research process, which, in turn, spills over to publishing and how effectively the researcher publishes his/ her research.*

*(*Please refer to the theoretical model on p298, explication of the ROP concepts, p299-301, and the interpretation of the theoretical model, p302).

Before evaluating several aspects of trustworthiness (listed below) by describing the natural history or research story of this study, it should be noted that, according to this researcher, the best evaluation of the trustworthiness of the developed theory came from discussion sessions with research participants whom this researcher contacted (or were approached by the participants) regarding the plausibility of theory as it developed. Participants were eager to receive feedback on results since all participants are academics that publish and welcome input that can assist them in publishing more effectively. In discussions it was obvious that the emerging ROP model was credible:

[129] *The* literature also points to the dependencies between the *research process* and the qualitatively evaluated *research climate* and *research practice* factors respectively.
[130] This was recorded in the field notes of this researcher and referenced on occasion in this thesis.

lively debates ensued around the availability and accessibility of research resources, methodology (research knowledge), statistical literacy (statistical knowledge), statistical support and resource centres and research climate (workload, limited time, administration), to name but a few. Suggestions were made as to how statistical services could be extended and a research resource centre (not research administration and monitoring) could be expanded. For example, one academic research complained*:*

> *'I am sick and tired of nagging and reminding that SAS and SPSS licences should be renewed in time – it is not my job to remind these people – I want to concentrate on research and teaching instead of spending three hours trying to arrange (and arouse!) licence renewal. Where is a proper resource centre that is equipped to co-ordinates these things?'*

In this regard an article by Berry (2012) was quoted that describes and acknowledges the effective functioning of academic/ clinicians and statisticians at Anderson Cancer Centre, University of Mexico.

The above assessment of participants stated, discussion turns to various aspects of the trustworthiness of the developed ROP theory. According to Glaser (1998); Charmaz (2012); Adolph et al (2011) and Lincoln and Gupta (1985), trustworthiness encompass, inter alia, the concepts of

(i) credibility ('the thoroughness of the research process');
(ii) confirm-ability ('how deductions and conclusions were derived, the input of the data and to lesser extent the interpretation of the researcher');
(iii) modifiability ('whether the theory is open to future modification'); and
(iv) dependability ('whether theory will stand the test of time/ is replicate-able').

The research story in brief

The reader will notice that up to this point I, the researcher has refrained from reporting research in the first person. The reason for this is two-fold:

(i) Firstly, as a statistician, I come from a quantitative background where figures have to be reported objectively. Therefore I had to present (and conduct) my research in the tradition that I feel comfortable with (I considered and embarked on a first person approach but this would not be true to my quantitative nature and 'felt awkward'). But, I do have a life-time story to tell - a research story (and the more qualitative GT approach of this study provided a means of telling this story).

The research story is a statistician's perspective because this has been my profession for nearly thirty years: statistical consultation, statistical analysis, write-up, editing and contributions to the statistical sections of articles. The sole purpose and intent of this research story is to contribute towards effective research execution via the continuation and improvement of statistical consultation and support, which eventually increase ROP. During this period I have observed many events that either hinder or advance the research process and publication of articles: misconceptions, limited research and statistical literacy, the importance of conveying statistical results understandably, the inability of researchers to integrate the statistical sections of their research in articles (and dissertations), responsibility roles in the research process, peer reviewers that review articles that do not fall in their field of expertise, to name but a few examples. This research is an attempt to bring these issues to the attention of academic researchers, future practicing statisticians and executive without shifting/ placing the blame for any 'blunder' on the shoulders of any party. The intent is towards the continuation of effective statistical services (which takes many years to develop and establish. Moriguti et al 1992:230) that support academics in an

appropriate way, and, the creation of awareness under academics of research requirements. Such an objective can only contribute towards improving research quality and output. A positive approach and an awareness approach.

(ii) Secondly, a trusting, collaborative relationship between academic researchers and statisticians are the norm in academic researcher/ statistician interaction. In these relationships the academic researcher is the primary role player and the primary contributor of research findings: academic researchers deserve the credit, acknowledgement and respect for research undertaking and publication of innovative findings they are the main contributors to research. (In this sense they are the reason why practicing statisticians exist). This situation does not, however imply that the statistician 'does not have a voice in research' (the statistician is a professional in an established and acknowledged discipline: Moriguti et al 1992; Berry 2012; Donalson and Gray 2005) and should not highlight and research impacting factors that can improve the research environment of both the academic researcher and statistician. However, in an attempt to create awareness of critically important issues the academic researcher (or statisticians) should not be downplayed when flaws in the research process are researched. These researched flaws can very often be attributed to misinformation and occur 'unknowingly' – if awareness is created, the quality of the research process will improve. Therefore in this research it is/ was often difficult to directly report narratives of incidents without 'identifying' the researcher and his or her research, or an academic journal: if a narrative in a radiation physics article is quoted in this thesis and a list of co-published articles – which has been used as a data source in this thesis – is also included in an appendix, a respected academic, or research journal or journal editor may be implicated and confidentiality breached. (The example provided is purely hypothetical). Therefore in this research reference to specific incidents has often been 'generalised' to protect the participant when reference is made to field notes. But examples are numerous and documented. By only reporting direct narratives sparingly (- which could create the impression that theory is fabricated) commitment to confidentiality, trust and future positive working relationships is not breached. This relationship is extremely important – not the 'exposure' of unfortunate events. Such events should rather be included as concepts of a theory of effectively conducting research.

The trustworthiness-aspects of modifiability, dependability, credibility and confirm-ability

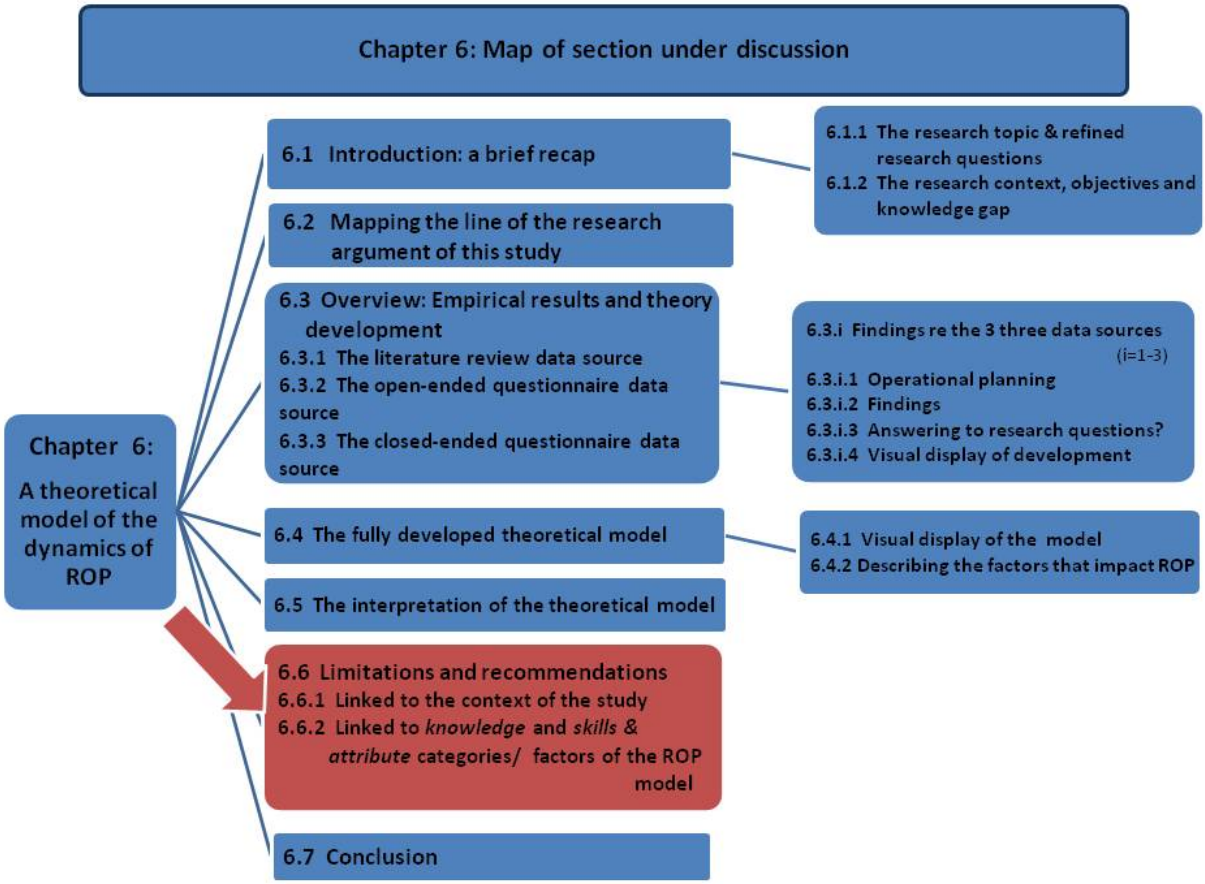
Against the background of the research story, trustworthiness of ROP is firstly evaluated against the criterion of modifiability (third paragraph of this section refers). This criterion is met since the developed ROP theory can be modified in future research to include additional influential ROP factors/ or categories that independent research might find important. The developed ROP theory of this research can serve as a theoretical departure point for future research/ers.

The evaluation of the ROP theory against the dependability criterion of trustworthiness is also positive: the basic concepts – although they can be labelled differently or be refined – will stand the test of time: for example statistical literacy and research knowledge or research literacy will remain basic requirement for quality research and the eventual publication of research articles.

The credibility- and confirm-ability criteria were addressed in this research by meticulously and transparently describing the steps of data collection and analysis from inception of the research to the final presentation of the ROP model. These for example include,

- the mapping of the original though process: a research roadmap, p150-151, Figure 4.1;
- the design of and compliance with criteria required of an electronic data capturing system to capture data events from the literature, p160;
- the evaluation of the literature as commencement phase data base, p154-156;
- the presentation of a coding scheme for events captured from the literature to the literature database, p160-164;
- the description of a detail example - on p167 - explaining how the concept of *attitude* emerged from literature-data-events captured in the literature database and which were the programmatic clustered using similar words or phrases that occurred in the in the open code (using the PROC FREQ procedure of the SAS, version 9.2 software package). ;
- the inclusion of detail results of all initial literature data analyses in Appendix 4, p373-386 that reports on the other ROP concepts that emerged from analyses: themes derived from the data events; and concepts or categories that emerged from these classification of events (Table 4.3, p166; Figure 4.2, p167; Figure 4.3, p171 and Table 4.29 refer);
- intermittent paragraphs in Chapters 4 and 5 that continually reflect on whether viable theory start to emerge (please refer for example to the comment on *environment* on p182*;* p201 on theory advancement);
- the motivation of an open-ended questionnaire as measuring instrument that would inform areas of uncertainty of developing ROP theory that needed further clarification and the administering of such a purpose-designed questionnaire to research participants that serve research in different capacities (for example, to inform the dimensions of an environment category by collecting responses from executive-managers, department heads, academic researcher and statisticians), 185-200
- The motivation of a closed-ended questionnaire to inform other additional areas of uncertainty (p215) of evolving theory by a delimited group of research participants (delimited to the research-environment). The capturing and analysis of response data to closed-ended questions and the process of theory refinement (p229-2267)
- And lastly the reasoning that led to the presentation of the final model in Chapter 6, Section p279-301)

6.6 Limitations and recommendations



6.6.1 Limitations of the research and the positive side of these limitations

The way research was conducted in this study imposed certain limiting constraints. These limitations are commented on in this section and cover aspects of the context of this study; the vantage point assumed in researching ROP; the quantitative evaluation of most (but not all) categories or factors of the ROP model; the constraints that an under-researched field brings to a research endeavour; possible research participant bias; a restrictive definition of research output delivery; factors or categories that only emerged as relevant effects towards the advanced cycles of analysis; and the positioning of the academic researcher within the theoretical model of ROP. Although these limitations are commented on in this section, the research argues that the listed limitations offer positive future development and refinement opportunities for the ROP model. In recognising and listing the limitations of the developed ROP model new guidelines for future research are actually compiled.

- *The specific research context of this study: UNISA as an ODL institution in South Africa*

As mentioned, the research context of a study imposes limiting constraints on a research undertaking and this applies equally to the ROP model of this study. In a grounded theory study such as this, results should be interpreted within the context of the study (Willig 2013: 69-70, 74). The specific research context of this study involves the institutional environment of UNISA – with a specific vision and mission statement, research and teaching objectives, and a physical positioning

capable of responding to the educational needs of approximately 450 000 students registered with this ODL institution in Sub-Saharan Africa.

In this study, literature formed the commencement data source, and knowledge gained from this source provided insight into international events and factors that impact on producing and publishing research. This can be attributed to the fact that a wide spectrum of national and international literature was sourced. In subsequent analysis cycles, responses to open-ended and closed-ended questionnaires further informed the study. These responses (and derived knowledge) came from participants who are mostly affiliated with a specialised, academic institution in South Africa, namely UNISA. UNISA has a specific research support structure, research culture and research preference. This research context - will differ from the research scenario at other HEIs. Modelled theory can therefore also differ (Willig 2013: 69-70). The common denominator among national and international academic institutions and this research however remains the quest for the effective publication of research findings in academically acclaimed journals. This problem and the need for solutions remain a worldwide objective.

If the research-model developed in this research is evaluated contextually, the framework can serve as guiding structure in future independent research set in different research contexts. Future investigations conducted in different contexts can therefore greatly enrich this research field.

- *A restrictive perspective: that of a research support statistician*

Environment, or vantage point, was identified in this study as an effect that impacts on ROP. This study was conducted from the vantage point of research support statisticians[131]. A different vantage point to this research, for example, an institutional executive approach or a departmental manager approach, could have explained and interpreted the dynamics of ROP differently. The vantage point to research assumed in this study could therefore be regarded as a limitation.

But research undertaken from different perspectives (e.g. institutional management) can enrich understanding of ROP. Future research undertaken from different research perspectives could initiate additional actions (from those discussed in the recommendations section of this chapter) to improve output productivity. For example, an executive management approach could result in structural change that follows on a deeper understanding of the needs of academic researchers (and support staff). The researcher-as-research-support-statistician approach of this study, however, resulted in a more specific, grassroots approach. This approach serves to create awareness within the academic researcher corps of impacting factors in the researcher environment and, at the same time, arouses interest in the executive corps of a HEI to the basics involved in producing and publishing research.

- *The constraints of a limited published research field*

Establishing a theoretical basis while researching a particular phenomenon

The limitation of a little researched area came to the fore in the sense that the main interest of this researcher originally lay with the teasing out of detailed grassroots elements (of the ROP categories)

[131]A practising statistician in a research support unit who supports research process-activities of academic researchers represents the community of research support statisticians

that advance or slow production and publication of findings - as observed and experienced in practical interaction in the research process. This represents aspects in the statistical support environment that the researcher wished to understand and improve upon. However, to lend credibility to research, a theoretical base had to be established. This resulted in an adjustment of research objectives[132] and in a sense limited the opportunity to research detailed, grassroots elements of research production and publication. Future independent research into grassroots activities within the research process will be a great asset to theory extension on the one hand and on the other to research institutions intent on improving publication rate.

Limitation turned benefit

Future investigation into the 'optimum roles and responsibilities' of research role players (including the researcher and statistician) in the research process will also contribute towards an improved publication rate. For example, the statistician's role in the research process/experience indicates that the skills of practising statisticians are crucial. Skills include, for example, consultation and knowledge transfer skills pertaining to statistical technique assumptions and implications; the importance of the link between statistical analysis and questionnaire design decisions; the consequences of sampling technique and sample size; ethical considerations; and the importance of research integrity in publishing quality research.

- *The research participants of this study: research experience bias*

Although the research participants for this study were theoretically sampled for specific reasons (Chapter 5, Section 5.1.3.2 and 5.2.2) this sample may, in some respects, be regarded as a biased group of researchers. This is ascribed to the fact that the researchers all come from a pool of researchers with at least (i) some research experience and who have all published at least one research article. The researchers were selected because the researcher of this study had served as co-author to at least one article with each researcher and had kept working files of each project. These served as field notes and additional data source for the study. Furthermore, these researchers had either (ii) a preference for qualitative- ($n_1 = 22$); or mixed- and/or quantitative ($n_2 = 10$) research approaches. The statistical angle of this study favours mixed and qualitative approaches. Qualitative researchers are not necessarily exposed to all issues raised in the closed-ended questionnaire of this research. Re-evaluation and quantification of ROP categories with a quantitative/mixed methods orientated participant group, and participants that are more representative of a broad range of research and publication experiences[133] could possibly more and more effectively assist in profiling researchers with respect to research output efficacy (for example by means of cluster analysis).

- *Research output defined as published articles*

The question might well be asked whether a more detailed model of research output productivity could have been developed had the definition of research output not been restricted to published articles in accredited journals. This restriction was imposed to keep the initial exploratory study within manageable proportions and to develop a rich explanation of research output productivity. Had the definition been extended to include the completion of postgraduate qualifications, the availability of more information could possibly have identified additional dimensions and categories

[132] Research had to refocus more on the theoretical building blocks and dynamics of a model of ROP
[133] Ranging from no research experience to extensive experience

of ROP. But this would involve processing additional volumes of data with the risk of not obtaining a saturated model of ROP. The choice between a more general and a more in-depth specific explanation of ROP had to be made.

However, research output in the form of completed postgraduate qualifications also earns research funding for higher education institutions in South Africa (Mouton, 2010) and, likewise, carries weight when funding is a concern and career progression is evaluated. Extension of the research to include the wealth of experience collected on these cases could greatly enhance an understanding of effective research output where output then includes articles and postgraduate qualifications.

- *The quantification of all ROP categories*

The fact that two ROP categories were not quantified (*research climate* and *research practice*) placed a restriction on the quantitative relationship-description between and within categories and the core category of the ROP model. As mentioned, specific theory development issues that received attention in the cycles of open- and closed-ended questionnaire data collection concerned *knowledge, skills, research resources, role players, attitude* and the *research process*.

A mentioned attribute of GTM is the fact that concepts evolve throughout analysis cycles and concepts are not pre-decided at the onset of research (as would have been the case in conventional research approaches). In GT research concepts gradually evolve and become structured as the research continues (Sbaraini et al 2011; Glaser and Strauss 1967). The concepts of *research climate* and *research practice*[134] were initially not clearly distinguished as factors/events in their own right and were regarded as elements or dimensions of the other ROP categories that had evolved up to this stage. In initial and interim research pressing issues relating to the other emerging categories required attention and were addressed by means of the open-and closed-ended questionnaires. The relevance of *research practice* and *research climate* became apparent in advanced analysis cycles and could therefore only be qualitatively verified by means of the literature. The effect of the quantification of all categories on a detailed explanation of the relationship/s between ROP categories and the core category could add to a deeper understanding of the dynamics of the ROP model.

- *Positioning the academic researcher in the ROP model*

Figure 6.4 presented a visual explanation of the ROP phenomenon. The final analysis cycles however increasingly pointed to the effect of the individual academic researcher on publication efficacy: the individual researcher dimension. Figure 6.5 introduces an additional researcher dimension to capture and highlight the importance of the role of the academic researcher in research output production. The issue of a more succinct visualisation of the model - with emphasis on the researcher dimension and quantitative relationships - remains open to discussion. How can the theoretical model best be visualised to capture the crux of the researcher role, the building blocks described in Table 6.1, and the quantified and qualified relationships that explain the dynamics of ROP? Such a visualisation is not an easy feat. But a cleverly designed picture can provide an overview

[134] Research questions were included in the closed-ended questionnaire that probed *research practice* but the concept was still vague and tentative when the questionnaire was designed and the elements selected to evaluate perceptions of *research practice* were therefore inadequate to evaluate research practice (Table 5.13, Chapter 5)

of the ROP phenomenon – which will catch attention and promote interest in the theoretical model. The importance of appropriate visualisation in explaining research reasoning is emphasised by Buckley and Waring (2013: 148-172) in the research argument of their grounded theory research.

6.6.2 Recommendations of this research based on the developed ROP model of this study

In addition to the recommendations linked to the preceding section of listed limitations of this study, additional recommendations that flow from the developed model of ROP are briefly[135] outlined in this section. The developed ROP model acknowledges the direct impact of the *academic researcher*, the *research process*, appropriate *knowledge* and appropriate *research skills* – with all dimensions and sub dimension of knowledge and skills implied - on research production and publication. The model also supports the indirect role of other components of the model on output productivity. The indirect role of other components is attributed to their significant associations with the *research process, knowledge and skills.* The other components include *role-players, research climate, research practice, researcher attitude* and *resources.* Recommendations listed below, although focused on the enrichment and development of researcher knowledge and skills, therefore (via indirect relationships) also include the other listed ROP components. The discussion intermittently refers to these ROP components.

- *Raising institutional research- and statistical awareness*

Research findings indicate that *environment* impacts on ROP. The institutional executive environment represents one such dimension. This dimension represents the decision makers that formulate research policy and dedicate funds, research- and human resources to colleges and schools of the institution. If the institutional executive is aware of the factors that impact ROP and with the knowledge- and skills requirements of researchers, this awareness will inform executive research decisions of optimum research conditions for researchers (given the proven prominence of knowledge and skills on ROP in this study).

This research therefore argues for:

A greater level of exposure of executive management to the practical research operations, achievements, requirement and needs of academic researchers is suggested. The purpose being to sensitise executive to the nature of research typical to specific research fields; training and development requirements to address subject-specific knowledge and analysis needs per research field; human resources and research resources (including statistical support) required to conduct and support research in specific subject fields; and consideration of a reasonable research/teaching balance of staff – a favourable research climate - to comply with the research output objectives of the institution. The voice of the researcher (and support services) should convey this message on an ongoing basis to executive. Research is a costly component to institutions and therefore this recommendation speaks to the core of ROP: subject-specific research varies in nature and therefore the research needs of disciplines require unique support systems to function optimally and effectively publish research.

[135] Nenty (2009) stresses that research recommendations should be brief, practical and executable.

These suggestions should receive the attention of the institutional executive who has the executive power to authorise and implement structural change.

- *Knowledge transfer: The need to capacitate academic researchers, supervisors[136] and mentors*

Knowledge transfer and the retainment of specialised knowledge within institutions form part of the knowledge and intellectual property debate worldwide (Villasenor 2012; Wamundila and Ngulube 2011). The importance of knowledge retainment and transfer is also evident in the fact that *knowledge transfer* has been added as critical performance area to IPMS and performance agreements of staff at UNISA (UNISA 2011; Dube and Ngulube 2013).

In this regard, the question is often asked of practising statisticians[137] as to how they facilitate knowledge transfer given the scarcity of statisticians and the time required to train a consulting statistician to support research execution. When a statistician retires or accepts another job offer, how does the current institution ensure that specialised knowledge remains within the institution? The question can be answered by indicating that research support statisticians regularly transfer statistical knowledge to academic and student researchers engaged in research, but, does this transferred knowledge remain within the institution? Student researchers mostly have temporary ties with academic institutions that end when they graduate. In this instance students take specialised knowledge out of the institutional system when postgraduate qualifications are completed.

Against this backdrop it is therefore recommended that:
Knowledge transfer should be directed at academic research staff because they form the link that ensures knowledge-retainment in the institution to the benefit of the institution. The recommendation implies that academic staff should be the first priority in terms of research and statistical knowledge transfer (from practising statisticians). Knowledge transfer to student researchers should flow from the academic staffs' pool of knowledge and expertise. A movement in this direction has been the design of a research protocol by the Statistical Support Unit of the College of Graduate Studies of UNISA. The protocol[138] is an agreement between the academic researcher-as-supervisor, the support statistician and the student to ensure that the academic researcher (supervisor) is in agreement with and informed on statistical support for data analysis of research undertaken by postgraduate students (the protocol is attached in Appendix 6.1 of this chapter). In this way the academic researcher maintains his or her responsibility role in research. At the same time statistical knowledge and expertise is also transferred to the academic researcher. Continual enrichment in this way ensures knowledge retainment and gradually enables the academic researcher to guide postgraduate students more independently with respect to the statistical considerations of the research.

This line of argument aligns with the findings of the impact of *knowledge* and *skills* on ROP, as well as with the practical experience of this researcher as evidenced in working files: if knowledge and skills are inadequate, the research process, write-up and publication of research is slowed down.

[136] Academic researchers also supervise postgraduate students..
[137] And to a greater extent of academic researchers
[138] The protocol was compiled by the researcher of this study to guide statistical support rendered to academic researchers.

- *Research resource centres as a component of research resources: specialised discipline-specific statistical units*

The feasibility of a research resource centre, with the exclusive purpose of specialised research support for researchers – separate from research administration – directly links to the recommendations (knowledge- and skills transfer, development and support) listed above. The ROP model of this study indicates the need for and relevance of research and statistical support services (Tables 4.32, 5.11 and 5.15, in Chapters 4 and 5 refer). Support services sought from a research resource centre would typically cover

(i) Training and knowledge needs;

(ii) Technical services; and

(iii) Statistical support.

This research therefore argues that research support – that which provides the services listed as (i) to (iii) - within UNISA be co-ordinated within a central Research Resource Centre.

At UNISA a research training schedule for academic researchers has been operational for a couple of years and has proved to be very effective (training resorts under the UNISA College of Graduate Studies). Training courses, inter alia, cover article-writing retreats and workshops; proposal writing; qualitative-; quantitative research-; research design courses; statistical software courses (e.g. SPSS); software for qualitative analysis (e.g. ATLAS-ti); and elementary and advanced statistical analysis courses:

(i) With regard to training courses the suggestion of this research would be to streamline and refine courses according to research specific fields: for example, in a specific research field a particular line of research design types, research methodologies, analysis techniques and software packages is usually appropriate. Courses per subject field should focus on preferred approaches and techniques typical of the subject field. For example, the research approaches of studies in theology and engineering are likely to differ. By focusing on subject specific needs in courses, research knowledge and experience applicable to subject research fields can effectively be transferred.

This research further argues – with specific reference to technical support at UNISA:

(ii) that a technical IT team within the ICT Department be exclusively dedicated to technical research support. The team should interact on a continuous basis with (or reside within) the proposed Research Resources Centre to attend to technical research matters. Examples of such proposed support include guidance concerning the most appropriate statistical packages, platform compatibility, continued licensing and version-agreements of software packages; to ICT support for the electronic capturing of community-based survey data[139]; technical support in converting designed research questionnaires to electronic format that can then be e-mailed to respondents, and responses to such e-mailed questionnaires automatically captured (a Monkey-Survey type of scenario); and technical guidance and support regarding access to and compatibility of institutional data bases should institutional data of UNISA be used in research[140]; and more.

[139] Where field workers manually collect responses from the community

[140] The ICT department of UNISA, although not the owner of UNISA data, is responsible for data information security

Ideally, to promote research efficiency in discipline-specific fields, a component of the proposed Research Resources Centre should provide services that simplify time-consuming research activities. Such activities include the recruitment and training of fieldworkers for community based survey studies, or consumer studies, or sensory panel members for sensory research studies and more. This study argues that research is a costly enterprise and the quality of collected data is critical to research integrity. If a component of the proposed Research Resources Centre is dedicated to the selection or recruitment and training of fieldworkers and/ or research-participants costly research time can be saved and appropriate people selected to participate in the research.

In this study, the *research resources* category of the ROP model primarily focused on statistical research support[141]. A statistically significant and positive correlation between the k*nowledge* component of the ROP model and *research resources* - which includes a *research resource centre* - was indicated (r = 0.67, on the 0.1% significance level. Table 5.18, Chapter 5 refers). *Research resources/statistical research support* therefore indirectly links to the ROP model. This verifies the importance of *statistical support* to ROP.

Concerning statistical support services, the research therefore suggests that:
(iii) A statistical support unit should form a component of the proposed Research Resources Centre. Practising statisticians should be appointed in a single unit of the Research Resources Centre but dedicated to disciplines with discipline-specific research approaches and statistical techniques. Structuring a statistical unit in this way will firstly allow statisticians to interact with fellow statisticians, improve expert statistical knowledge and transfer knowledge to young statisticians. In this way scare statistical knowledge within the academic institution will be retained and transferred. In the second instance, a structure of statisticians dedicated to specific research fields will ensure effective statistical support to academic researchers by support statisticians who specialise in specific research fields.

The concept of a Statistical Support Unit with several statisticians dedicated to research fields and a coordinator that oversees research project distribution is embraced in different formats by several national HEIs, including the STATOMET statistical unit of the University of Pretoria. The unit renders statistical consultancy and support services, as well as statistical consultancy training (Fletcher 2014). Furthermore the Statistical Consultation Services unit of the Potchefstroom campus of the North-West University offers statistical support and consultancy services to academic researchers and postgraduate students (Mashau, Steyn, V D Walt and Wolhuter, 2008:423). Likewise, the following units render a form of statistical research support: the Research Resource Centres of the University of Transkei and the University of Fort Hare (Mji and Glencross 2002: 1-6); the Statistical Support Unit of the Tshwane University of Technology (TUT 2015); the Statistical Consultation Services of the Medical Science Research Unit of the University of the Witwatersrand (University of the Witwatersrand 2015); and the Unit for Statistical Consultation, Nelson Mandela Metropolitan University (Nelson Mandela Metropolitan University 2015).

[141] Th motivation for this focus was explained in the discussion on the design of the closed-ended questionnaire in Chapter 5

Internationally this trend is more specialised and in some cases, privatised. Examples include the Consulting Services Division of the University of Illinois, 2015; the Statistical Consultation and Research Centre of the KERK School of Medicine, University of Southern California (KERK Medical School 2015); and the Research and Statistical Unit of the Department of Paediatrics of the Stanford School of Medicine (Stanford Medical School 2015). Lastly, the Cornell Statistical Consulting Unit (CSCU) of the University of Cornell, USA offers an extensive array of statistical services (Cornell University 2015)[142].

This research argues that the need expressed for research resources and a research resource centre at UNISA echoes similar needs of other academic researchers that have been addressed in various ways at the above-mentioned national and international HEIs.

- *A protocol for requests for the services of research support statisticians*

Recommendations listed in this section, Section 6.6.2, aim to improve the production of research and the publication of research articles. Because this study was undertaken from the vantage point of research support statisticians, some of these recommendations concern effective statistical support services but with an emphasis on how statistical involvement can promote ROP.

In line with this argument it is furthermore suggested that:
To effectively formulate researcher needs with respect to support services required of statisticians and optimise the allocation of such requests to available statisticians, a protocol for statistical support should ideally be completed. An example of such a protocol currently phased in at UNISA is presented in Appendix 6.1 of this chapter.

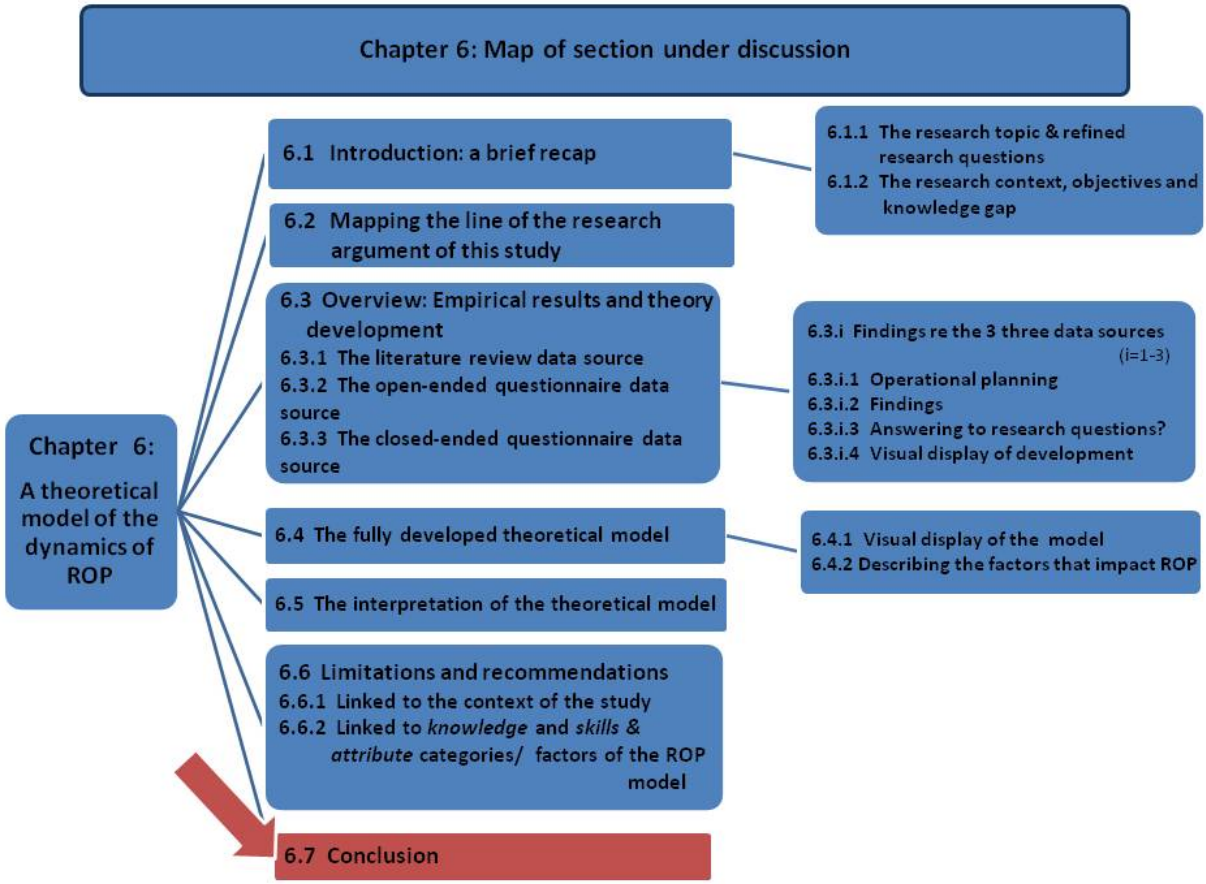
- *Discipline-specific research manuals and discipline-specific statistical technique manuals*

Discipline-specific research methodology and statistical technique manuals will also aid the effective transfer of appropriate knowledge within research fields/ departments and safeguard the retainment of knowledge within the institution: if skilled researchers/statisticians leave the employment of an institution, valuable knowledge components are retained and continuity is ensured in this manner.

Statistical technique manuals should, for example, discuss analysis techniques most often used within a discipline combined with specific procedures of statistical software packages applicable to analysis techniques in a discipline-specific research field. If this approach is followed, academic researchers (especially inexperienced researchers) will not be overwhelmed by a volume of information that is not necessarily applicable to their field and which they have to work through to distinguish those techniques and applications applicable to their research field.

[142] The option of a national electronic research support centre that provides statistical support is also propagated. This scenario allows researchers to electronically submit statistical queries and statistical analysis requests to a central unit. This enables a consortium of researchers and HEIs to share costly statistical support.

6.7 Conclusions



This study set out to explain the dynamics of the ROP phenomenon. Effective publication of research findings allows new knowledge to become available. Indeed, the pivotal contribution of new, relevant, quality and timely knowledge cannot be overrated. Numerous spheres of society depend on such knowledge-information in decision making, planning, and development actions. The international community, government and HEIs therefore encourage and reward the publication of research findings (in accredited journals) in various ways. Incentives are not only directed at the academic researcher but also at HEIs, and funding at South African universities is proportional to research output. Published articles form a substantial proportion of the research output of HEIs. These actions impact on the environment in which academic researchers teach and do research. In the light of the insistent demand that researchers publish more quality research, the ability to publish effectively is a pressing issue for academic researchers and role players involved in the production and publication of research.

This research was approached from the perspective of research support statisticians. This perspective was followed because practising statisticians who support academic researchers often observe possible stumbling blocks in the research process that could impact on effective research execution and successful publication of research findings[143]. Limited research has been undertaken in the area of interest to this research and classic grounded theory was used to develop a theoretical model on ROP. This model identified effects that, at the academic researchers' level of 'doing

[143] As previously indicated the researcher of this study is appointed as a research support statistician at Unisa.

research', impact on the effective publication of research findings (as articles in DHET accredited journals).

The research identified *knowledge; skills and attributes of researchers; research resources; research climate; attitude; research practice;* and *role players* as factors that, in interaction with the critical effect of *the research process,* impact on how effectively research is published. In advanced cycles of analysis the effect of the type of researcher emerged as significant. In conjunction with the effects of *skills and attributes*, *knowledge*[144] and especially the *research experience* dimension of the *knowledge* of researchers - proved to have a direct impact on the *research process* and consequently on ROP. The effect of the other factors (excluding knowledge and skills) on the *research process* is explained as indirect because of the interrelated nature of these factors with *knowledge* and *skills and attributes of researchers*. Research indicated that researchers with varying levels of research and publication experience approach the *research process* differently and have distinctively different mind sets or *attitudes* [145] towards research and how research is conducted: the more experienced researcher assumes more research responsibility and ownership of the research process which is pivotal to effectively publishing research.

The knowledge gained from the developed theoretical model can be put to effective use only if cognisance is taken of the factors that emerged prominently in the research, namely, the basic tools of *skills and attributes of researchers* and *specialised knowledge* (which includes subject specific knowledge, statistical and research knowledge and experience). These effects cannot be separated from the academic researcher-as-person since the academic researcher is a component of the ROP model.

In Chapter 1 the importance of the timely availability of new, quality and reliable knowledge for the advancement of the scientific and general community was underlined. This research came full circle to arrive at the verified findings that knowledge, skills and attributes, and the type of researcher involved in research, form the key components in the delivery of required new knowledge.

(The appendices to Chapter 6 are included in the General Appendix at the end of the thesis)

[144] Regression analysis and discriminant analysis results, Section 6.3.3.2 of this Chapter and Section 5.3.5.1 of Chapter 5.
[145] Discriminant analysis results, Section 6.3.3.2 of this chapter and Section 5.3.5.2, Chapter 5.

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General appendices, Chapter 2 to 6

Appendix 2.1, Chapter 2

Informal notes made to capture data events in the literature that mention concepts/ conceptualisations/ abstractions/ factors or events that affect research output delivery

Table 2.1
An example of the informal notes made to capture data events in the literature that mention concepts/ conceptualisations/ abstractions/ factors or events that affect research output delivery

Some of the keywords used in searches of the internet: stats literacy ; stats literacy prerequisite for research output productivity; stats literacy a barrier to article writing; stats literacy promotes research output/ publication; statistical skills/ and research output; academic articles and research output/research output proficiency and researcher/ statistician co-operation; quantitative research output (many, many more)	
Topics discussed	References
Se discussion section of article – ij quantitative and qualitative sections not properly integrated, article does not succeed. idea of how to include examples from own articles to explain problems?	Adapted Harvard style specified for CEDU M&D theses. Bronstein, LR, & Kovacs, PJ. 2013. Writing a mixed methods report in social sciences. *Journal of Research on Social Practice* 23(3), 254-360.
Correct analysis techniques and stats literacy	
stats literacy/ techniques Most soil research requires well-established standard statistics. The analysis techniques have been programmed and are readily available in computer packages, and researchers should be able to trust the outcome. Soil scientists' main failings are now in choosing the statistics appropriate for their purposes and in presenting their results with understanding. Bear in mind finally that statistical processing and analyses are means to ends in soil research and that their outcomes must make pedagogical sense.	Webster R. 2009.Statistics to support soil research and their presentation. European Journal of Soil Science. Vol 52(2), 331–340. http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2389.2001.00383.x/full
Likes/ dislikes of journal editors	
How editors feel about weight of quantitative qualitative part of articles, p18	Bryman A. 2013. Barriers to integrating qualitative and
techniques should be correct and appropriate if published: 'Appropriate and efficient experimental design is a critical component of high-quality science. Most of the papers surveyed did not use randomisation (87%) or blinding (86%), to reduce bias in animal selection and outcome assessment. Only 70% of the publications that used statistical methods described their methods and presented the results with a measure of error or variability. This survey has identified a number of issues that need to be addressed in order to improve experimental design and reporting in publications describing research using animals'	Kilkenny C, Parsons N, Kadyszewski E, Festing MFW, Cuthill IC, et al. 2009. Survey of the Quality of Experimental Design, Statistical Analysis and Reporting of Research Using Animals. PLoS ONE 4(11): e7824. doi:10.1371/journal.pone.0007824 **Editor:** Malcolm McLeod, University of Edinburgh, United Kingdom
correct interpretation of techniques' Unfortunately, lack of power is not the only statistical flaw found in some experimental stroke studies. A list of such defects includes: lack of correction for multiple comparisons; reporting of ordinal variables (e.g., from histological or neurobehavioral scores) with standard error of the mean (s.e.m.) or standard deviations (s.d.) (instead of median and range), and statistical comparisons of these values with a *t*-test (instead of a χ^2 test). The majority of experimental stroke studies describe numerical data as means $\pm$s.e.m.'s instead of s.d.'s. This promotes 'nice' graphical displays but obscures the (large) variance of the data. The s.e.m. is a measure of precision of an estimate of a population parameter. In other	Dirnagl, U. (2006). Bench to bedside: the quest for quality in experimental stroke research. *Journal of Cerebral Blood Flow & Metabolism*, *26*(12), 1465-1478.

words, it tells us how accurately we can estimate the mean. However, what we usually want to be informed about is the variability of the observations, which is given by the s.d. Statisticians have fought for decades to ban the use of s.e.m.'s (and with less fervour, even of s.d.'s) for reporting numerical biomedical data, and instead advocated the use of CIs (Reichhardt and Gollob, 1997; Gardner and Altman, 1995).	
Academic literacy/ professional development (same?)	
(Lillis 2001**16.** Lillis, T.M. 2001. *Student writing: Access, regulation, desire*, London: Routledge. An academic literacy approach argues that pedagogical practices around writing must be embedded in a broader socio-linguistic context. In contrast to a focus on 'writing' alone, the academic literacy approach embraces a broader range of literacy practices and understandings pertaining to the academic environment, including, for example, discrete disciplinary and generic scholarly practices such as speaking, reading, critiquing and writing.- must be able to write	Aitchison C. 2009.Writing groups for doctoral education. Studies in Higher Education. Vol 34(8) http://www.tandfonline.com/doi/full/10.1080/03075070902785580
Writing skills/ researcher/statistician	
Writing skills statistician: Statistics education is often restricted to teaching the mathematical equations and theories that form the foundation of statistical analysis. It can be argued, however, that the interpretation of the analysis and the communication of the results are equally important. The interdisciplinary role of statisticians requires us to examine real-life problems critically and communicate analytical results to non-statisticians in a clear and concise manner. This article discusses the importance of including writing assignments as a routine part of statistics courses and presents benefits of the increased use of writing	Radke-Sharpe N . 1991. Writing as a form of statistics education. The American Statistician Volume 45, Issue 4, 1991
English proficiency	
In European top research universities funding and English proficiency prove to be a stat significant contributor towards publication efficacy	Man JP, Weinkauf JG, Tsang M, Hogg J and Sin DD. Why do Some Countries Publish More Than Others? An International Comparison of Research Funding, English Proficiency and Publication Output in Highly Ranked General Medical Journals. European Journal of Epidemiology. August 2004, Volume 19 (8). 811-817
while publication in today's English-only research world requires sound research in readable English, English proficiency may be a problem for the productivity of non-native English-speaking (NNES) countries. Data provided by the Brazilian National Research Council (CNPq) containing the academic profile of 51,223 Brazilian researchers show a correlation between English proficiency and publication output. According to our results, traditional input indicators may fall short of providing an accurate representation of the research performance of NNES developing	Vasconcelos SMR, Sorenson MM & Leta J. 2009. A new input indicator for the assessment of science and technology research? Scientometrics 80(1) 217230.
This article proposes the rhetorical transfer hypothesis as a possible explanation for their additional difficulty. Our results also reveal that their increased perceived *difficulty writing RA discussions in English* (as L2) does not decrease noticeably until Spanish researchers report high or very high levels of proficiency in English (as L2) for academic or general purposes or have published on average at least 37 RAs as corresponding author in English-medium journals over the last ten years. Implications for English for Academic Purposes (EAP) research and pedagogy are	Moreno, A. I., Rocha, J. R., Burgess, S., Navarro, I. L., & Sachdev, I. (2012). Spanish researchers' perceived difficulty writing research articles for English-medium journals: the impact of proficiency in English versus publication experience. *Ibérica: Revista de la Asociación Europea de Lenguas para Fines Específicos (AELFE)*, (24), 157-183.

Statistical thinking/ reasoning	
Motivating essence of necessary statistical thinking def: stats thinking	Garfield & Ben_Zvi. Book. Developing student's statistical reasoning http://books.google.co.za/books?hl=en&lr=&id=lAZMh4aRmA4C&oi=fnd&pg=PA3&dq=research+output+proficiency+statistical+collaboration&ots=8Vdjg8ozZB&sig=djAk3ZhZAy8adFk99rz2tfOgbDA#v=onepage&q&f=false
Statistical consultancy	
	Kenett, R., & Thyregod, P. (2006). Aspects of statistical consulting not taught by academia. *Statistica Neerlandica*, *60*(3), 396-411.
	Buchheit, S., Collins, A. B., & Collins, D. L. (2011). Intra-institutional factors that influence accounting research productivity. *Journal of Applied Business Research (JABR)*, *17*(2).
	Perkmann, M., & Walsh, K. (2008). Engaging the scholar: Three types of academic consulting and their impact on universities and industry. *Research Policy*, *37*(10), 1884-1891.
Good one: Statistical consulting is a growing field but its relevance has not been fully appreciated, especially in many Nigerian Universities and Higher Institutions. This paper posits that acquisition of statistical consulting/collaboration skills among higher education students is highly instrumental to educational and research development in Nigeria. We survey the awareness, practice and teaching of statistical consulting in one of Nigeria's foremost universities. We also offer some suggestions	*Awe OO, Oguntuase DM. 2013* Acquisition and Utilization of Statistical Consulting/Collaboration Skills among University Students in Nigeria: A Recent Survey. International Journal for Computer and Electronics research. **IJCER, Vol 2, No 2 (2013)** http://www.ijcer.org/index.php/ojs/article/view/213
plea for statistical consulting: 'Scholarly journals like *Stroke* or the *Journal of Cerebral Blood Flow* no longer feature statistical consultants on their editorial boards, and statisticians no longer partake in the scientific discourse (Ford, 1983). In addition, instructions for authors do not mention statistics, let alone specific statistical requirements or standards. In contrast, some experimental (e.g., American Physiological Society, 2005) and eminent clinical journals like *The New England Journal of Medicine*, *The British Medical Journal*, or *The Lancet* publish extensive and specific guidelines for acceptable statistical procedures, as proposed by the 'Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication (URL see Table 4). This apparent lack of attention to statistics is distressing, as it is not uncommon to find violations of statistical standards in published papers in experimental stroke research.	

research funding	
In European top research universities *funding and English proficiency* prove to be a stat significant contributor towards publication-efficacy. This was investigates by means of Tobit regression (explain what is regarded as 'input' and what as 'output)	Man JP, Weinkauf JG, Tsang M, Hogg J and Sin DD. Why do Some Countries Publish More Than Others? An International Comparison of Research Funding, English Proficiency and Publication Output in Highly Ranked General Medical Journals. European Journal of Epidemiology. August 2004, Volume 19 (8). 811-817
Publisher criteria and publishing process	
process of publication has changed/ article content changed and *article reviewed numerous time*s. Review time has escalated, length of articles have escalated, p5, **mathematical model** for possibility of article acceptance in Economics. and table of increase in delay in review process and length of articles - interesting	Ellison, Glenn. "Evolving Standards For Academic Publishing: A q-r Theory," Journal of Political Economy, 2002, v110(5,Oct), 994-1034
requires more 'techniques and methods' thus quantitative research	Bell RK, Hill D and Lehming RF. 2007. The Changing Research and Publication Environment in American

	Research Universities
responsibility of editors and reviewers 'Scientific publication *is a powerful and important source of information*; the authors of scientific publications therefore have a responsibility to *describe their methods and results comprehensively*, accurately and transparently, and *peer reviewers and journal editors share the responsibility to ensure that* published studies fulfil these criteria	
Peer review process in publication; how done; reviewers do not always review in their field	
Good reference: Despite the variety in domains of knowledge production, peer-reviewed journals remain the standard for dissemination of information by individuals working in university environments. Stevan Harnad (1999) describes peer review as a quality control and certification process made necessary by the scale of knowledge being developed in today's academic environment. Without a review process, discerning the reliability and validity of new work would become an arduous task. According to *Sense about Science* (2005, p. 6), "Peer review is an essential dividing line for judging what is scientific and what is speculation and opinion". In 2004 there were approximately 20,000 peer-reviewed journals throughout the international academic community. Together these journals published 1.5 million articles annually (Kandziora, 2004). The notion that an idea or concept could not be considered respectable until it had first appeared in a peer-reviewed journal did not become widespread until after the Second World War (Tipler, 2003). Postwar industrialism and advances in scientific knowledge induced scholars to conduct ever-increasing amounts of research; publishing was seen as the way to quantify the quality of a scholar. Universities began to realise that the professional and scholarly reputations of academics had a profound effect on the prestige of the employer Although there are no universal criteria by which reviewers judge papers, there are some generally accepted standards. Typically, papers are judged on validity, originality, methodology, findings, discussion, theoretical perspective, and the paper having sufficiently important findings worthy of publication. If the reviewers agree that these criteria have been met, the paper may be sent back to the author(s) for revisions prior to acceptance or accepted for publication without alteration (Tipler, 2003). For the last 50 years there has been relatively little change to the peer review process, although with the advent of the internet, the process has become primarily electronic The effort by academic journals to promote quality and fairness through the peer review has been met with mixed results (many references) but peer review is also susceptible to bias (Wood *et al* many references) **NB NB :** It is Starbuck's further assertion that a reviewer's decision on what is worthy of publication is the primary deficiency within the scholarly publishing industry: impact-rating of articles and freely availability of article	Erik W. Black EW. 2008. Wikipedia and academic peer review: Wikipedia as a recognised medium for scholarly publication?, Online Information Review, Vol. 32 Iss: 1, pp.73 - 88
reviewers who are statisticians should review quantitative research **..** Today, it is difficult to know the exact size of the job market for individuals with **expertise** in **statistics** because **statisticians** can work under a variety of job titles (eg, researcher, methodologist **...** Whereas almost anyone with psychometric or **statistical** training can analyse the **...** Title: "Why doctorates in psychology and other applied fields make desirable consultants in **statistics.** Journal: Practice and **Research**, 2010 - apa.org	Cole JC & Dang J. 2010. Measurement, Monte Carlo, and music: Consulting Psychology
teamwork in research/ skills in teams	
Skills within a team research as team work p15. Lack of skills in the team writing skills/ research skills/ integration of article skills	Bryman A. 2013.
Collaborative research	
The type of measure used to assess research performance affects value of collaboration Web link: so far analyse the effects of scientific collaborations at a level of a single **researcher**. **...** result confirms the importance of international relations since a good English	Carillo MR. Papagni AS. 2011. Do collaborations enhance the high quality **output** of scientific institutions? Evidence from the Italian **Research** Assessment (2001-2003) http://www.siecon.org/online/wp-content/uploads/2011/04/Carillo-Papagni-Sapio1.pdf

proficiency implies also a **...** In modelling the **research output** of an academic unit, we assume that the **research output ...**	
	Abramo, G., D'Angelo, C. A., & Di Costa, F. (2009). Research collaboration and productivity: is there correlation?. *Higher Education*, *57*(2), 155-171.
Best-rated Brazilian articles use networks and collaboration	Meneghini, R., & Packer, A. L. (2006). Articles with authors affiliated to Brazilian institutions published from 1994 to 2003 with 100 or more citations: II-identification of thematic nuclei of excellence in Brazilian science. *Anais da Academia Brasileira de Ciências*, *78*(4), 855-883.
Defined and specified methodology & Research approach should be structured lack of methodological expertise	
Mixed method qualitative and quantitative research should be in zinc p13, p11	Bryman A. 2007. Barriers to integrating quantitative and qualitative research. Journal of Mixed methods research. Vol 1(1) 8-22.
the tail wags the dog when the questions researchers ask are determined by their limited knowledge of methods that can be employed to answer those questions. **Methodological expertise** not only helps	Robin K. Henson, Darrell M. Hull, and Cynthia S. Williams **Methodology in Our Education Research Culture: Toward a Stronger Collective Quantitative Proficiency** Educational Researcher April 2010 39: 229-240,
Several factors in China research (especially attitude)	
Slow advances however, have been made in medical research in developing countries [3] and more funding, material and logistic support has been provided for conducting research. Nevertheless, the quality of research is affected by lack of expertise in research skills [4]. Problems are also seen in sharing and dissemination of results locally [5] and in incorporation of research findings in policy making [4]; either because a lack of understanding of research findings or its clinical implications by the health policy makers. Literature shows that clinicians' interest and involvement in research has declined in recent years [6,7]. Several studies have looked at attitudes and interest in research among doctors working in various specialties and subspecialties. In the primary care field, most studies found time, financial constraints [7], busy clinical practices [8] and lack of interest [9] as major deterrents to clinicians' involvement in research. Other similar studies identified financial incentives and infrastructure support as key factors in promoting research [10]. Age and gender differences in research interest were also seen with younger physicians showing more inclination towards research [11] and a comparatively smaller involvement of female physicians [7]. Inadequate mentorship and lack of time have been other major barriers in research [12,13]. Bland and Ruffin [14] and Brocato and Mavis [15] identified accessible resources, appropriate rewards, time allocation, promotion and tenure as stimulators for research and scholarly productivity.	Saniya Sabzwari[1], Samreen Kauser[1] and Ali K Khuwaja. 2007. Experiences, attitudes and barriers towards research amongst junior faculty of Pakistani medical universities. BMC Medical Education. Vol **9:68**
Lack of stats support	
see table 2	Sabzwari S[1], Kauser S[1] and Khuwaja AK. 2007. Experiences, attitudes and barriers towards research amongst junior faculty of Pakistani medical universities. BMC Medical Education. Vol **9:68**
Research output productivity hindered by lack of support services	Schulze, S. 2008. Academic research at a South African higher education institution: quality issues. South African Journal of Higher Education, 22(3):644-661
Lack of awareness; research findings; stats awareness	
The three most frequently cited barriers to using research were insufficient time on the job to implement research findings, insufficient	Retsas A, Nolan M. 1999

time to read research and a lack of awareness of research findings.	
Experience	
Co-authorship, previous publications, research training	Maske KL, Durden GC and Gaynor PE. 2007. Determinants of scholarly productivity among male and female economists .Journal of Economic Enquiry. Vol 41(4)
Training; stats literacy; writing skills researcher; **writing skills statistician (compare other stats literacy entry)**	
writing skills statistician Cannot access article – ask library	Radke-Sharpe N . 1991
How quantitative methods are used in the literature and taught in doctoral programs. Evidence points to deficiencies in quantitative training and application in several areas: (a) methodological reporting problems, (b) researcher misconceptions and inaccuracies, (c) overreliance on traditional methods, and (d) a lack of coverage of modern advances. An argument is made that a culture supportive of quantitative methods is not consistently available to many applied education researchers. *Collective quantitative proficiency* is defined as a vision for a culture representative of broader support for quantitative methodology	Henson RK, Hull DM & Williams CS. 2010. Methodology in Our Education Research Culture Toward a Stronger Collective Quantitative Proficiency. Education Researcher Vol 39 (3)
Statistical expertise in research output	
Good motivation: the need for statistical competencies http://onlinelibrary.wiley.com/doi/10.1111/j.1949-8594.2008.tb17850.x/pdf	Ben-Zvi Garfield. 2010. Introducing the Emerging Discipline of Statistics Education. Journal of School Science and Mathematics. Vol 108 (8) p 335-361
Quote: 'Researchers rely on statistics and informatics as never before to generate and test hypotheses and to discover patterns of disease hidden within overwhelming amounts of data. Too often, clinicians and biomedical scientists are not adequately proficient in statistics to analyse data or interpret results, and statistical expertise may not be properly incorporated within the research process. We argue for the ethical imperative of statistical standards,' http://onlinelibrary.wiley.com/doi/10.1002/sim.4282/full	Gelfond, J. A.L., Heitman, E., Pollock, B. H. and Klugman, C. M. (2011), Principles for the ethical analysis of clinical and translational research. Statist. Med., 30: 2785–2792.
Requires/ needs stats: Peers, I. S., Ceuppens, P. R., & Harbron, C. (2012). In search of preclinical robustness. *Nature Reviews Drug Discovery*, *11*(10), 733-734.	
CD DeAngelis, PB Fontanarosa - JAMA: The Journal of the …, 2010 - Am Med Assoc: : Motivation for stats contribution to articles/ research. Do not have article: CD DeAngelis, PB Fontanarosa - JAMA: The Journal of the …, 2010 - Am Med Assoc **...** these efforts at reporting details regarding data management, statistical analysis, and sponsor **involvement** in clinical **...** an independent analysis of the data must be conducted by an independent **statistician** at an **academic** institution, rather than by **statisticians** employed by the **...** The most fundamental principle of medicine, *primum non nocere*, holds for every physician, whether functioning as a clinician providing direct patient care; as a researcher, reviewer, or editor involved in medical publishing; or as an administrator overseeing an academic institution, health care organization, or pharmaceutical company research program. In all situations affecting patients, physicians must do no harm. The Commentary in this issue of *JAMA* by Nissen[1] describes a disturbing example of inappropriate conduct surrounding an industry-sponsored clinical trial of *rosiglitazon*e and reveals a situation in which concerns about preserving market share apparently trumped concerns about the potential for causing patient harm.[2] Analysing this situation and others involving misleading reporting and possible misrepresentation of industry-sponsored research[3-7] has become only too common, and it appears that physicians functioning at several levels failed to put the well-being of patients first.	
Attitude: towards research; towards team members; towards research	
Attitude towards research	Retsas A, Nolan M. 1999. Barriers to nurses' use of research: an Australian hospital study. International journal of nursing Science. Vol 36(4) 335-343.
attitude towards quantitative research	Williams M, Hodgkinson L and Payne G. 2004. A crisis of number? Some recent evidence from British sociology .Radical statistics. No 85

	http://www.radstats.org.uk/no085/Williams85.pdf
Stats literacy (quantitative literacy); examples of stats literacy; training as post grad student (recommendations?); stats specific and discipline specific knowledge gap (see other stats literacy entries)	
examples of stats literacy: Jordan J and Haines B. 2006. The Role of Statistics Educators in the Quantitative Literacy Movement. *Journal of Statistics Education* Volume 14 (2). www.amstat.org/publications/jse/v14n2/jordan.html webpage library guidelines, Michigan State University, http://libguides.lib.msu.edu/print_content.php?pid=285761&sid=2351663 **What is Quantitative Literacy? LOOK @ WEBSITES THEY LIST FOR PROMOTING STATS LITERACY – another recommendation of study toi stimulate stats literacy?** • Research methods knowledge base: (see content list) http://www.socialresearchmethods.net/kb/contents.php • Stastslit.org: http://www.statlit.org/ • Social Sciences data analysis network: http://www.ssdan.net/ • (census data) • Teaching with data : http://www.teachingwithdata.org/ (tutorials and lessons) etc 'There is no standard dictionary definition to quote, but put simply, quantitative literacy is the ability to understand and interpret numerical information. There are a number of terms that are often used interchangeably (although distinct meanings may be parsed out) to discuss the concept of quantitative literacy: statistical literacy, data literacy, and numeracy. Quantitative Literacy involves a familiarity with the research methods that are used to gather and manipulate data. This allows you to make sense of the charts, graphs, tables and statistics that appear in the news, journals, books and websites that you read and to view their validity with a critical eye. Quantitative Literacy is not restricted to the mathematical disciplines. In fact, Library Data Services focuses on serving the social sciences here at MSU. Statistics are used to describe social problems and chart historical trends over time. There are many library resources that contain data and statistics. Library Data Services supports the development of quantitative literacy by helping researchers identify high-quality sources of numeric information and by promoting the use of critical thinking skills to interpret data and statistics. Classroom and personal instruction on the identification and use of library resources are available by request.	
Study recommendation How to promote stats literacy/ quantitative reasoning/ informal thinking (inferential reasoning part of stats literacy)	Zieffler A, Garfield j< Delmas R and Reading C. 2008. A framework to support research on informal inferential reasoning. Statistical Educational Research Journal. Vol 7(2) 40-58. http://iase-web.org/documents/SERJ/SERJ7(2)_Zieffler.pdf
stats proficiency required to produce best rated research in Brazilia Multicenter case-control studies comprise a medical field that requires professional competence of the participants, capacity to manage the network and proficiency in statistical analysis. Several studies of this nature were detected in this survey; the discussion in Packer and Meneghini 2006 already mentioned	Meneghini, R., & Packer, A. L. (2006). Articles with authors affiliated to Brazilian institutions published from 1994 to 2003 with 100 or more citations: II-identification of thematic nuclei of excellence in Brazilian science. *Anais da Academia Brasileira de Ciências*, *78*(4), 855-883.
require stats literacy to choose correct methods Most soil research requires only well-established standard statistics. The analyses have been programmed and are readily available in computer packages, and we should be able to trust the outcome. Soil scientists' main failings are now in choosing the statistics appropriate for their purposes and in presenting their results with understanding. Bear in mind finally that statistical processing and analyses are means to ends in soil research and that their outcomes must make pedagogical sense.	Webster R. 2009.Statistics to support soil research and their presentation. European Journal of Soil Science. Vol 52(2), 331–340. http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2389.2001.00383.x/full
Output deserves input: p40. Quantitative article and research	Williams M, Hodgkinson L and Payne G. 2004. A

more believable and reliable – need for quantitative articles. p41 p42: problem with production of research output (or should it be 'research input'?) Compares figures on quantitative/ qualitative and mixed methods research articles p43 table quantitative content in courses p44 attitude towards quantitative research	crisis of number? Some recent evidence from British sociology. Radical statistics. No 85 http://www.radstats.org.uk/no085/Williams85.pdf
Stats training not effective towards equipping for research competencies stats link in research and many specific field. Many disciplines far removed from stats thinking. Research/ stats education should address diverse backgrounds of researchers Link **stats-specific knowledge and discipline specific knowledge** Training guidelines towards stats literacy. recommendations)	Reston E. 2007. Model of student learning in graduate statistic education: towards statistical literacy and research competence. paper at: 56th International Statistics Institution Conference also: Jordan J and Haines B. 2006. The Role of Statistics Educators in the Quantitative Literacy Movement.
what statistics should learn students to do research: courses p11: guidelines to teaching stats literacy: need and cost of data production, and correct analysis and problem formulation	Garfield JB,& Ben-Zvi D. 2008. Developing Students' Statistical Reasoning: Connecting Research and Teaching Practice. Springer Science and Business Media.
TRAINING & attitude: (Factor analysis & anova research findings indicate: we created composite scores reflecting the identified four factors: confidence in mathematical or statistical competency, perception of the practical utility of mathematical or statistical concepts, belief that mathematics or statistics contributes to personal growth, and level of interest in pursuing further study in mathematics or statistics	Jordan J and Haines B. 2006. The Role of Statistics Educators in the Quantitative Literacy Movement. *Journal of Statistics Education* Volume 14 (2). www.amstat.org/publications/jse/v14n2/jordan.html

Subscale	**Pre-Course Mean (Standard Deviation)**	**Post-Course Mean (Standard Deviation)**	***P*-value (Based on Paired *t*-test)**
Confidence	23.32 (5.00)	25.19 (4.45)	0.038
Practical Utility	42.61 (5.90)	44.61 (6.38)	0.050
Personal Growth	30.52 (5.31)	32.42 (4.19)	0.018

Transfer of knowledge; Statistical knowledge transferred to researcher; stats knowledge transferred to article	
Statistics Transfer Research	Jordan J and Haines B. 2006. The Role of Statistics Educators in the Quantitative Literacy Movement. *Journal of Statistics Education* Volume 14 (2). www.amstat.org/publications/jse/v14n2/jordan.html
Excellent factors/ events	
Really good: • Research collaboration and research integration: international, interdisciplinary; inter-institutional • Institutional structure/ constraints/ priorities & measure p 16 • commercialization/ quantity & quality p18, • government & institutional regulatory	Bell RK, Hill D and Lehming RF. 2007. The Changing Research and Publication Environment in American Research Universities Working Paper | SRS 07-204 | July 2007 Division of Science Resources Statistics, USA National Science Foundation http://nsf.gov/statistics/srs07204/pdf/srs07204.pdf

compliance p20 (ethics resort here) • teaching load • English proficiency • securing funding and administering funding p19	
Research output proficiency: time, support to do research, previous research experience, more productive in research	Alghanim, S. A., & Alhamali, R. M. (2011). Research productivity among faculty members at medical and health schools in Saudi Arabia. *Saudi Med J*, *32*(12), 1297-1303. http://scholar.google.co.za/scholar?start=10&q=research+output+productivity+:+the+researcher+and+statistician%27s+role&hl=en&as_sdt=0,5
Dubai: notice government/ institutions/ resources. Good 'The barriers and strategies to overcome research can be classified into three categories based on key stakeholders: the government (or policy makers); the industry or market conditions; the institutions. Strategies at the individual academic level are also identified which may overcome more macro environmental limitations'	Balakrishnan MS . **2013**.Methods to Increase Research Output: Some Tips looking at the MENA region.", International Journal of Emerging Markets, Vol. 8 (3)
How academic research changed: more researchers, motivation changed.	VINCENT-LANCRIN, S. T. É. P. H. A. N. (2006). What is changing in academic research? Trends and futures scenarios. *European Journal of Education*, *41*(2), 169-202.
Other factors than stats relayed ; outside practice effect on academic publishing	Lowe, R. A., & Gonzalez-Brambila, C. (2007). Faculty entrepreneurs and research productivity. *The Journal of Technology Transfer*, *32*(3), 173-194.

recommendations?; writing groups/ writing workshopse	
writing groups/ writing workshops There is a considerable body of research that demonstrates the powerful connection between talk and writing (Leander and Prior 2004**14.** Leander, K. and Prior, P. 2004. "Speaking and writing: How talk and text interact in situated practices". In *What writing does and how it does it: An introduction to analysing texts and textual practices*, Edited by: Bazerman, C. and Prior, P. 201–37. Mahwah, NJ: Lawrence Erlbaum. and of student's desire for more dialogue around their writing (Lillis 2006**17.** Lillis, T.M. 2006. "Moving towards an 'Academic Literacy' pedagogy: Dialogues of participation". In *Teaching academic writing in UK higher education: Theories, practices and models*, Edited by: Ganobcsik-Williams, L. 30–45. Basingstoke: Palgrave Macmillan. View all references). For most writing groups, 'talk' is the fundamental vehicle by which group members engage in a reflexive practice that connects reading and writing for the building of meaning. Writing groups exemplify an academic literacy approach to writing, since participants come together specifically for the social production and consumption of writing. Writing groups can be a particularly valuable means for institutionalising writing as a legitimate component of research education (Kamler and Thomson 2006**10.** Kamler, B. and Thomson, P. 2006. *Helping doctoral students write: Pedagogies for supervision*, London: Routledge. View all references), and for encouraging the development of a writing culture by providing rewarding opportunities for sustained student engagement and participation.	Aitchison C. 2009.Writing groups for doctoral education. Studies in Higher Education. Vol 34(8) http://www.tandfonline.com/doi/full/10.1080/03075070902785580
stats literacy: web based courses and website	
Role of statistician and components of the research process – role responsibilities??	
Role of the statistician	Cameron M. 2009. Training **statisticians** for a **research** organisation. Proceedings of the International Statistical Institute 57th …, 2009 - statssa.gov.za.
What is research productivity	
factors that affect research	White, C. S., James, K., Burke, L. A., & Allen, R. S. (2012). What makes a

productivity: time, workload, assistance (does this include statistical assistance), etc,	"research star"? Factors influencing the research productivity of business faculty. *International Journal of Productivity and Performance Management*, *61*(6), 584-602.
Research resource centres. (Transkei)	
What they do to promote research	Glencross, M. I. C. H. A. E. L., & Mji, A. N. D. I. L. E. (2001). The role of a research resource centre in the training of social science researchers. *Training researchers in the use of statistics*, 245-257.
Sociology and what is needed of statisticians	Mason, W. M. (1991). Freedman is right as far as he goes, but there is more, and it's worse. Statisticians could help. *Sociological Methodology*, *21*, 337-351.
Research process	
the research process :BOOK. Advice on stats consultancy;	Ader, H. J., Mellenbergh, G. J., & Hand, D. J. (2008). *Advising on Research Methods: a consultant 愀 companion*. Johannes van Kessel Publ.
Industry relations with university affecting research proficiency	
Manjarrés-Henríquez, L., Gutiérrez-Gracia, A., Carrión-García, A., & Vega-Jurado, J. (2009). The effects of university–industry relationships and academic research on scientific performance: Synergy or substitution?. *Research in Higher Education*, *50*(8), 795-811.	

grounded theory/ applicable version	
http://cms.educ.ttu.edu/uploadedFiles/personnel-folder/lee-duemer/epsy-5382/documents/Grounded%20theory%20methodology.pdf : GT Research methodology Strauss, A, and Corbin, J. *Strategies of Enquiry*. Chapter 17 Grounded theory Methodology 273-285	
http://epress.anu.edu.au/info_systems02/mobile_devices/ch12.html	
http://onlinelibrary.wiley.com/doi/10.1111/j.1467-6486.2006.00662.x/pdf	Shah, S. K., & Corley, K. G. (2006). Building Better Theory by Bridging the Quantitative–Qualitative Divide*. *Journal of Management Studies*, *43*(8), 1821-1835.lysis
http://www.nova.edu/ssss/QR/QR2-4/pandit.html/pandit.html	Pandit, NR. 1996. The creation of theory: A recent application of the grounded theory method. *The qualitative report*, *2*(4), 1-14
http://www.aacorn.net/members_all/parry_ken/paradox.pdf	Kan, M. M., & Parry, K. W. (2004). Identifying paradox: A grounded theory of leadership in overcoming resistance to change. *The Leadership Quarterly*, *15*, 467-491.
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http://www.biomedcentral.com/content/pdf/1471-2288-11-128.pdf	Alexandra Sbaraini1,2*, Stacy M Carter1, R W Evans2 and Anthony Blinkhorn . 2011. How to do a grounded theory study: a worked example of a study of dental practices. *BMC Medical Research Methodology* 2011, **11**:128 doi:10.1186/1471-2288-11-128
http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2648.2001.01897.x/pdf	Eaves, Y. D. (2001). A synthesis technique for grounded theory data analysis. *Journal of Advanced Nursing*, *35*(5), 654-663.
http://ejournals.library.ualberta.ca/index.php/IJQM/article/view/4605/3757	Glaser, B. G. (2008). Conceptualization: On theory and theorizing using grounded theory. *International Journal of Qualitative Methods*, *1*(2), 23-38.
http://www.emeraldinsight.com/journals.htm?articleid=1463194&show=abstract	Goulding, C. (2005). Grounded theory, ethnography and phenomenology: A comparative analysis of three qualitative strategies for marketing research. *European journal of Marketing*, *39*(3/4), 294-308.
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Strauss, A, and Corbin, JM. 1998. Basics of Qualitative Research: techniques and Procedures for Developing Grounded Theory. 2nd Edition. Thousand Oaks, California: Sage Publishing Co.	

quote on agreement with post-positivsm: that an apprehendable truth exists p 102	Straus, A, and Corbin, J. 1998. Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. 2nd Edition. Thousand Oaks: Sage Publication Co.
http://www.hu.liu.se/cf/larc/utbildning-information/scientific-methodology/course-literature-and-links/1.253557/Grounded20theory_3pdf.pdf GT research methodology	??Egan, TM. 2002. *Advances in Developing Human Resources*. Chapter 3: Grounded Theory Research and Theory Building. 4(3):277-295. Thousand Oaks, CA: Sage Publications.
http://www.groundedtheory.com/what-is-gt.aspx# webpage Grounded theory Institute	
http://groundedtheoryreview.com/2012/12/07/surviving-grounded-theory-research-method-in-an-academic-world-proposal-writing-and-theoretical-frameworks/	??Elliott, N, and Higgins, A. 2012. Surviving Grounded Theory Research Method in an Academic World: Proposal Writing and Theoretical Frameworks. *Grounded Theory Review. An International Journal* 2(11).
Creswell, JW. 1998. *Quality Enquiry and Research Design: Choose among five traditions.* London: Sage Publishing Company .	
http://www.cfd.med.utoronto.ca/resources/Lingard-Grounded_Theory.pdf http://mmr.sagepub.com/content/1/2/112.short http://www.stiba-malang.com/uploadbank/pustaka/RM/BASIC%20OF%20QUALITATIVE%20RESEARCH.pdf http://edr.sagepub.com/content/33/7/14.short http://ejournals.library.ualberta.ca/index.php/IJQM/article/view/4402/3795 http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2929.2005.02378.x/full http://srmo.sagepub.com/view/the-sage-dictionary-of-social-research-methods/n143.xml Participant observation: Glaser and Strauss (1967), Strauss and Corbin (1990), Lindgard, Albert and Levinson (2008) and Kennedy and Lindgard (2006), Ethnography: http://en.wikipedia.org/wiki/Ethnography	Lingard, L., Albert, M., & Levinson, W. (2008). Grounded theory, mixed methods, and action research. *Bmj*, *337*(aug07_3), a567-a567. Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of mixed methods research*, *1*(2), 112-133. Corbin, J., & Strauss, A. (2007). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage Publications, Incorporated. Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational researcher*, *33*(7), 14-26. Mills, J., Bonner, A., & Francis, K. (2008). The development of constructivist grounded theory. *International journal of qualitative methods*, *5*(1), 25-35. Coffey A. 2006. Participant observation. The Sage Dictionary of research methods. 215-217 Participant observation. (2013, June 15). In *Wikipedia, The Free Encyclopedia*. Retrieved 15:22, June 28, 2013, from http://en.wikipedia.org/w/index.php?title=Participant_observation&oldid=559999794 Ethnography. (2013, June 23). In *Wikipedia, The Free Encyclopedia*. Retrieved 15:20, June 28, 2013, from http://en.wikipedia.org/w/index.php?title=Ethnography&oldid=561262493 Kennedy, TJ, and Lingard, LA. 2006. Making sense of grounded theory in medical education. *Medical Education*, *40*(2):101-108. Borgatti, S. Introduction to Grounded Theory. Available at: http://www.analytictech.com/mb870/introtogt.htm. Accessed: 28-06-2013 Glaser, B, and Strauss, AL. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research.* Chicargo: Aldine Publishing Company. Practice Qualitative Research

	Grounded theory, mixed methods, and action research
Theory and research methodology	
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http://www.indiana.edu/~educy520/readings/fawcett86.pdf	
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Anfara, V, Mertz, NT. 2006. Theoretical Frameworks in Qualitative Research. Thousand Oaks: Sage Publication Inc..	
***** http://libguides.usc.edu/content.php?pid=83009&sid=618409	Labaree, R. 2013. Organizing your social research paper. USC Library Guide Series. (University of South Carolina) by Robert Labaree - Last Updated Jun 25, 2013 Trochim, WMK. 2006. Philosophy of Research. Research Knowledge Base.
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Definition research http://www.sosyalarastirmalar.com/cilt3/sayi11pdf/tavallaei_abutalib.pdf	LEEDY, P. D., & ORMROD, J. E. (2005). Practical Research Planning and Design (5th ed.). New Jersey: Pearson Merrill Prentice Hall. In A General Perspective on Role of Theory in Qualitative ResearchMehdi TAVALLAEI••••*Mansor ABU TALIB** Uluslararası Sosyal Ara □ırmalar Dergisi. The Journal of International Social ResearchVolume 3 / 11 Spring 2010
http://www.esourceresearch.org/eSourceBook/SocialandBehavioralTheories/3TheoryandWhyItisImportant/tabid/727/Default.aspx	Glanz K. Behavioural and Social Science research. e-Source Series. Accessed at: http:/www.esourceresearch.org, on 9-07-2013. Glanz, K, Rimer, BK, and Viswanath, K. 2008. Health Behaviour and Helath Education: Theory, Research and Practice. 4th Edition. San Francisco: Jossey-Bass.
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diagrams	
http://www.edrawsoft.com/arrowsdiagram.php	

Appendix 2.2

Designing a framework to structure collected data from the literature re the ROP knowledge gap and the production and publication of research findings (article publication)

Sent: 15 November 2013 03:55 PM

Table 2.2
Structuring promising data sources collected to answer to a couple of questions regarded of interest to the study when the introductory literature review was conducted
Question 1: How to most aptly label the research topic? *Research output productivity/ proficiency/ delivery/ academic publishing?*

Research output productivity(topics discussed and references)		
1. What is academic research (output) productivity		• 1.Factors that affect academic research productivity http://www.jstor.org/stable/pdfplus/25061660.pdf?acceptTC=true&acceptTC=true&jpdConfirm=true
2.Research output productivity – articles	• age, vintage effect, investment motivated, most recent educated • age fellowship • perfectionism • mobility is the key factor *chptr 1 intro, teach load, grant, academic background, human capital, research environment (teaching vs research) biographical attributes: age, qualifications, perfectionism, international exposure, *research environment, *financial factors: funding, financial gain, fellowships) * factors: funding, time, qualifications, research environment, •individual faculty, environment, leader attributes (research environment?) ----Productivity index; -- productivity index	• Research output productivity over the life cycle: Evidence for academic scientists, 1991, the American Economic Review 81(1), 114-132, Levin, S,G. & Stephan, P.E. of .. 1991 (age and financial gain) http://scholar.google.co.za/scholar_url?hl=en&q=http://www.researchgate.net/publication/4980482_Research_Productivity_over_the_Life_Cycle_Evidence_for_Academic_Scientists/file/79e4150ac27080d3e1.pdf&sa=X&scisig=AAGBfm2Z7J_oBmlurKGYvfzA_8y5Fyq3jA&oi=scholarr&ei=DvKFUr3CFI-rhAeR44DoDQ&ved=0CCsQgAMoATAA • Profile and scientific output analysis of physical therapy researchers holding 2013 Sturmer, G. http://www.ncbi.nlm.nih.gov/pubmed/23538457 • *Perfectionist professors have lower research productivity 2011 Charbonneau L, University Affairs (daily). (personality trait) http://www.universityaffairs.ca/perfectionist-professors-have-lower-research-productivity.aspx • *Mobile professors are academically more productive 2011, Plume, A. 2011, The Academic Executive Brief, UK. (travelling increase article publ) http://academicexecutives.elsevier.com/articles/uk-study-reveals-internationally-mobile-researchers-are-significantly-more-productive • Research productivity of Australian academic economists:human-capiutal and fixed effect. Rodgers, J.R. & Neri, F.V. 2007. Australian Economic Papers 46(1),67-87. • *The ombudsman: Factors influencing academic research productivity: A survey of management scientists. Hankock, T., Lane, J., Ray, R. & Glennon, D. 1992, Interfaces, 22(5):26-38 www.jstor.org/stable/25061660 • …2012 http://jetems.scholarlinkresearch.org/articles/Factors%20Affecting%20Research.pdf • *Factors that affect the research productivity of academic staff: the case of the MOi University, Eldoret Journal of Emerging Trends in Economic and Masnagement Sciences 3(5), 475-484, 2012 Sulo, T.,Kendagor, R., Kosgei,D., Tuitoek, D. & Chelangat, S. 2012 Moi Univ Kenya (funds, env, qualify, time) http://jetems.scholarlinkresearch.org/articles/Factors%20Affecting%20Research.pdf • Bland, C.J., Center, B.A., Finstrad, D.A. & Risbey, K.R., Staples, J. 2006. The impact of appointment type on the productivity and commitment of full-time faculty in research and doctoral institutions. The journal of Higher Education, Ohio State University Press, 77(1):89-122. ----2.Index to characterize scientific output productivity 2012(index) Http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1283832/ --A simple generalizable method for measuring individual research productivity, 2013, Wootton, A. www.link.springer.com/article/10.1186%2F1478-4505-11-2
Research output proficiency – (academic) articles		
		•
Research output delivery – (academic) articles		
		•
Academic Publishing/ Academic article publication		
what is academic publishing - articles		•
8.publishing research findings		• 8. http://www.sicet.org/journals/ijttl/issue0502/Maddux_Liu.Vol1.Iss2.pdf • *is qualitative research 2nd hand? http://www.ncbi.nlm.nih.gov/pubmed/21383987
16."what make a research	--- editorial comments	• 16.;;;; mostly editorial comments on requirements:

article acceptable for publication'	--- journal guidelines --- journal policy	http://www.insidehighered.com/advice/ph_do/advice_on_how_to_deal_with_journal_article_submissions • journal guidelines and journal policy-------- http://www.nature.com/nature/authors/get_published/

Question 2: **Has research been done on Factors affecting ROP? Will further research be unnecessary?** ***Literature on Factors that affect RO productivity***		
•Factors in general:		
What affects research output productivity	*human capital: human resources *research environment *financial incentives *biographical attributes *other company effect	• 4.Research productivity of Australian academics (human capital r environment) 2007 http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1315&context=commpapers • Incentives for researchers to drive up r o productivity 2013 http://www.universityworldnews.com/article.php?story=20130712145949477 • Review of lit on scientists r productivity 2012 (biographics and other) http://www.iva.se/PageFiles/16280/Review%20of%20Literature%20on%20Scientists%E2%80%99%20Research%20Productivity.pdf • What determines productivity 2011 -------- production level of businesses http://home.uchicago.edu/syverson/productivitysurvey.pdf • Exploring firm effects in pharmaceutical… --- how companies perform --- 2011 https://faculty.fuqua.duke.edu/~charlesw/s591/willstuff/oldstuff/PhD_2008_2009_LongStrat/Readings/Extra/HendersonCockburn1994_SMJ.pdf
22. why do some research articles get published and others not?		• 22.a* Guidelines to article layout http://www.columbia.edu/cu/biology/ug/research/paper.html • a* How far can scientists go to publish their rejected articles http://www.researchgate.net/post/How_far_are_scientists_willing_to_go_to_publish_their_rejected_articles_or_scientific_reviews • a* How and why masters and doctoral students should publish their research http://blogs.egu.eu/palaeoblog/2013/04/18/should-masters-students-publish-their-research/ • ---- how to manuals
20."challenges the researcher encounter when preparing research articles publication		• 20.a* The researh process http://www15.uta.fi/FAST/FIN/RESEARCH/research.html • a* what challenges to researchers face…. http://www.sagepub.com/mertensstudy/articles/Ch_8-4.pdf • a* ------publication issues ethical issues, writing issues, legal issues journal selection issues; research topic/ question formulation issues
7. what determines the research output of academic economists?		•7.http://www.ucl.ac.uk/research/UCL-Research-Strategy-2011.pdf •http://onlinelibrary.wiley.com/doi/10.1111/j.1475-4932.1999.tb02454.x/abstract •http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.140.9496 •http://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=4&sqi=2&ved=0CEkQFjAD&url=http%3A%2F%2Feconomics.adelaide.edu.au%2Fevents%2Farchive%2F2005%2FResearch-productivity-of-Australian-academic-economists-human-capital-and-fixed-effects.pdf&ei=_MGEUuqyOeih7AbMjoEw&usg=AFQjCNFvW7WVw_Emu2eAFPZJVOKaobNzQA
9.(what/or) factors that affect the publication of (quantitative) research findings		• 9.http://www.jisc.ac.uk/media/documents/publications/communicatingknowledgereport.pdf • 10.* http://chronicle.com/article/We-Must-Stop-the-Avalanche-of/65890/ • * http://www.researchinfonet.org/publish/finch/
11.(what) issues that (delay/or) hinder acceptance of (quantitative research) articles		• 11.* http://www.emeraldinsight.com/journals.htm?articleid=17068488
• **Effect of the research process/ method/ methodology on ROP** very little reference to statistical component		
23.."the research process that underlies successful research output delivery		23.----------types of research, philosophy,
doing (quantitative)research and research output productivity - articles	• Beads, Edwards: collaboration, talent managements….	• watching the detectives http://www.nature.com/scitable/blog/watching-the-detectives/how_should_we_measure_research • what drives research productivity …. beads Edwards …. https://solutions.mckinsey.com/successlab/_SiteNote/WWW/GetFile.aspx?uri=:/successlab/default/en-us/Files/wp1591276990/McKinsey-RAndD-

		Compendium-SuccessLab_e95a23ea-b486-4567-9584-9798afd06ad5.pdf •
how research is done/ doing research & research productivity	• Model of research process – one in 5 refer to stats methods, research process education, support researcher, role researcher, Chr 1 • phases of career affect research output • metric quality research papers: talent/ problem solving/ collaboration, Related to productivity research: --getting more done --measure impact of research output --- research productivity measures --what drives r productivity -- research jobs ---library tools in research	• Research as a process: a comparison between different research approaches Bukvova H. 2009. Sprouts:working papers on Information Systems, 9(29) http://sprouts.aisnet.org/9-29 see Lacey comments: findings disseminated via publications • Review of literature on researchers research productivity 2012 www.iva.se/Review%20of%20Literature%20on%20Scientists'%20Research%20Productivity • how measure productivity? 2010 Beards, Edwards,Sheikh 2009 www.nature.com/scitable/blog/how_should_we_measure_research_productivity -- The psychology of getting more done 2012 www.sparringmind.com/productivity-science --- scholars seek better metrics for assessing research productivity 2013 www.chronicle.com/articles/Scholars-Seek-Better_metrics/62618/ --- 6 unexpected research findings: productivity 2013 US army www.betterproductivityblog.com/6-unexpected-research-findings-in-productivity-research --The secret of high productivity in the research lab 2009 McKinsey, S. https://solutions.mckinsey.com/successlab/GetFile.aspx? -- UNDP jobs 2013 Research on jobs https://jobs.undp.org/cj_view_job_cfm?cur_job_id-40640 -- research productivity, collaboration, workflow www.swets.com/research_productivity
21."research processes that deliver quality report of research findings		• 21.---- Addresses quality issues and standards --------- • * The role of the researcher... http://www.qualitative-research.net/index.php/fqs/article/view/1021/2201
• **Editors and peer reviewers**		
		•
• **Quality of research on ROP**		
research output productivity and research practice/ research process		•
(academic) research productivity and the research process		•
19.******"doing research right for publishing in articles		• 19.a* Good publication practice http://www.bmj.com/content/339/bmj.b4330 • a* How to write and publish in hymophelia.. http://www1.wfh.org/publications/files/pdf-1477.pdf • a* Seven challanges in writing for… http://www.waldenu.edu/about/newsroom/publications/articles/2010/01-research-challenges • -------- how-to-write guides
how to ensure quality in the research process to increase research publication	• concerned with the quality and how to improve assessing quality	• Appraising Qualitative Research in Health Education: Guidelines for Public Health Educators http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3012622/ • improvimng the quality of investment research http://www.asic.gov.au/asic/pdflib.nsf/LookupByFileName/rg79-published-10-December-2012.pdf/$file/rg79-published-10-December-2012.pdf •
quality in the (quantitative) research process increases research output	• quality assurance issues • guidelines to ensure quality in qualitative research (medical) similar to guidelines in medicine of quantitative journals.	• quality assurance of qualitative research: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3267652/ • improving the quality of quantitative studies http://fampra.oxfordjournals.org/content/29/4/367.full •

what constitutes good research	•	•
• **Effect of researcher attributes on ROP**		
what qualifies an academic researcher to do research	• what to publish where to be notable, world trend •analytic mind, social skills, controlled, intelligent, curious, quick thinker, committed, writing/ verbal skills, systematic, sympathetic •basic (share, understandable..); good process -() & good success () qualities, •** excellent list of attributes, but no mention of stats knowledge: need-to-know-; being effective; team/collaborative; contribute to wider environment ---- CV.s, ---job applications -- academic visitor/researcher -- job positions, -- research project qualifies -- requirements to qualify -- notable academics -- recognition students as academics --post doc career options as... --proposal requirements (Hamburg) --	• what should researchers be concentrating on?.... http://www.theguardian.com/higher-education-network/blog/2012/feb/21/ref2014-what-researchers-concentrating-on • Top 10 qualities good researcher 2011 Kerry Millen , Market Research Expert http://marketresearchexpert.co.uk/2011/02/02/top-10-qualities-required-to-be-a-good-researcher/ • Good qualities of researcher Camilo Tabinas 2010 Science 2.0 www.science20.com/flexi_chem_teacher/blog/good_qualities_researcher_note_beginners_camilo_tabinas • Researcher development statement, Careers Research & Advisory Centre, UK, 2010, Vitae www.vitae.ac.uk --- www.admin.ox.uk Academic visitors --- Research in Gemany www.research-in-genamny.de/junior-careers --- UK border agency www.ukba.homeoffice.gov.uk -- FAQ Research office www.research.uci.edu -- Research excellence framework www.nadinemuller.org.uk/the-new-acdemic-guides/the-ref/ -- Many scientists' notability… www.en.wikipedia.org/wiki/Wikipedia:Notability_(academics) -- Research Strategy Office, Cambridge.. www.admin.cam.ac.uk/offices/rso/cref/eligibility/index.html --Post doc career options www.uni-hamburg.de --Industry-academia pathways and partnership www.ec.europa.eu/research/mariecurieactions/about-mca/actions/iapp/
researcher properties in quantitative research analysis	•researcher attributes ----Def quantitative research -- Def qualitative research --how researchers analyze qualitative data --Def quantitative research --survey analysis has characteristics --researchers group properties to gain insight/ course material --Properties & dimensions researchers find in GT -- researchers have to specify properties/analysis --qual vs quant comparison	• Researcher's corner www.informindioa.co.in/iil_newsletter_research_asp -- -- Quantitative research , researchers measure…http://www.en.wikidepia.org/wiki/Quantitative_research -- Qualitative research, interviews, various data sources http://en.wikipedia.org/wiki/Qualitative_research --Qualitative data, analysis and design 2011 www.sagepub.com/upm-data/43144_12.pdf -- What researchers use http://www.libguides.usc.edu --The logic of qualitative survey research.. 2010 Hansen www.qualitative-research.net -- O[pen coding, Calgary University 2010 www.pages.cpsc.ugalgary.ca/~saul/wiki/uploads/CPSC681/open-coding.pdf -- Qualitative research: GT methodology www.academia.edu/Qualitative_Research_Grounded_Theory_Method --properties of quality qualitative reports www.psych-it.com.au/Psychlopedia/article.asp?id_342 --Note 3 Qualitative research Vs Quantitative research www.slideshare.net/shayaa/group-assignment
research output productivity: researcher attributes	•	• http://www.innovation.gov.au/Research/ResearchWorkforceIssues/Documents/ResearchSkillsforanInnovativeFuture.pdf •
researcher attributes required in research process	• development strategies • general qualities • Diligence and persistence, creativeness and innovativeness, objectiveness, open mindedness, orderliness and cleanliness, cautious, accuracy and precision, quickness and responsiveness, Keenness, systematic and reasonableness, and cooperation and leadership	• Top 10 qualities required to be a good researcher http://marketresearchexpert.co.uk/2011/02/02/top-10-qualities-required-to-be-a-good-researcher/ • Good qualities of a researcher http://www.science20.com/flexi_chem_teacher/blog/good_qualities_researcher_note_beginners_camilo_tabinas-70065 • http://www.uel.ac.uk/gradschool/resources/doclibrary/documents/Vitae-ResearcherDevelopmentStatement.pdf • UK research guidelines http://www.uel.ac.uk/gradschool/resources/doclibrary/documents/Vitae-ResearcherDevelopmentStatement.pdf

		•
• Researcher skills		
3. Research output productivity & research skills	***MODEL *skills *collaboration *research environment influence of env., institutional env., research admin research directors research projects *human capital researchers teamwork *governance *leadership participatory decision making	• 3.Research skills for a productive future https://faculty.fuqua.duke.edu/~charlesw/s591/willstuff/oldstuff/PhD_2007-2008/Papers/C10/HendersonCockburnRAND.pdf • building a productive model... http://www2.massgeneral.org/facultydevelopment/cfd/pdf/Predictors%20of%20Research%20Productivity.pdf • the impact of research collaboration http://sss.sagepub.com/content/35/5/673.full.pdf+html •Characteristics of a Productive Research Environment: Literature Review. Bland, Carole J.; Ruffin, Mack T., IV Academic Medicine, v67 n6 p385-97 Jun 1992 A review of the literature on university faculty research productivity found a consistent set of 12 characteristics common in research-conducive environments. Findings included (1) the leader has a disproportionate impact through his influence on all the other characteristics, and (2) participative governance is important in promotion of research productivity. (Author/DB) Descriptors: College Environment, College Faculty, Environmental Influences, Governance, Higher Education, Institutional Environment, Leadership, Participative Decision Making, Productivity, Research Administration, Research Directors, Research Projects, Researchers, Teamwork, Universities http://muse.jhu.edu/journals/journal_of_higher_education/v077/77.1bland.pdf
Researcher skills analyzing and reporting quantitative research	• what is research • Phd students profile and future requirements	• understanding research http://www.etu.org.za/toolbox/docs/development/research.html •
• Human capital (right person/ right job)		
research output productivity and human capital		•
• Governance/ management		
research output productivity and governance		•
• Research support services		
15.“academic publishing and research support services”		• 15.------- references mainly library services and publishing services http://www.bris.ac.uk/library/support/research/ • c* http://www.newcastle.edu.au/service/library/research/research-support-services.html
research output productivity and research support services		•
• Work environment/ research environment		
6.work environment and research productivity	***** Models of research environment (6 models, HULL, HURLEY, Kanter, Martin & Skea 1992; Udwadia) Hull : ROP=f(org design, work) * SAND: Udwadia : ROP = F(r Attributes; resources; org; mngmnt) *SAND: Factors affecting ROP (Martin & Skea) * SAND: researcher attributes (Pelz) * SAND: environment attributes (Pelz) * research output production is a process *SAND and opther article by Hurley attributes of research environment (Hurley; Ryan & Herley – r env effects r productivity p348 Ryan & Hurley **general:** planning & insight in problem, clear focus, able to	•SAND REPORT: Attributes in the research environment that foster excellent research: an annotated Bibliography, 2003, Jordan,G.B., Streit, L.D. & Mataisek, J. Sandia National Laboratories. U.S Dept of Commerce, Springfield, VA. http://prod.sandia.gov/techlib/access-control.cgi/2003/030132.pdf Factors that affect RO Productivity: Martin and Skea: staff, funds, time, leadership, atmosphere, resources, age/ career structure, mngmnt attitude, •An empirical examination of the relationship between scientists’ work environment and research performance. 2007. Ryan, J.C. & Hurley, J. R&D Management 37(4):345-354

	learn, **individual:** traits & skill: motivated, proud collaboration: team work, collective genius, goal driven, determined, talented, international, inspirational, confidence in success, skills talent, cooperative, leader provides resources, adaptable, work, communicate, r culture, biog profile diverse,rewards, recruit & select **resources**: Human & technical, funds, resources **organizational**: characteristics & structure: knows what people and resources and research is required, personal/comp goals, culture of learning, self imporvement **Management**: R&D management practices; institutional collaboration, drive anticipated needs; take on excellent research; strategic mngmnt of innovative 'resources' projects, scientists, budget, people, cross-functional communication between parties	•http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9310.2007.00480.x/pdf •Managing the unmanagble ..... https://www1.oecd.org/edu/imhe/42348780.pdf#page=11
• Researcher and statistician/ Collaboration		
researcher and statistician in research publication	• recognizes stats contribution; requests editors for stats input; • medical research should be accurate – stats helps • recognizes role of statistician • recognizes role of statistician -- job description of statistician/ advert --statistics on careers, also statistician	• How statisticians help psychologists do their research better. Gelman A, 2013, www.andrewgelman.com/how-can-statisticians-help-psychologistsdo-their-research-better - see 'statistician' search-keyword below • I don't believe that paper, "empirical estimates suggest…. Gelman, A, 2013 www.andrewgelman.com/I-dont-believe-the-paper-empirical-estimates-suggest see statistician search-keyword below • statistician qualified to co-author? http://www.researchgate.net/post/Is_a_statistician_qualified_to_be_a_co_author_in_a_research_paper see 'statistician' search-keyword below • is it necessary to learn statistics before writing a research blog site www.researchgate.net/Is_it_necessary_to_learn_statistics_before_writing_a_paper -- Statistician(researcher, 2013, www.kreftregisteret.no/Gerneral/About-the-statistician-researcher -- Revenue & Customs: HMRC research report series, 2013, www.hmrc.gov.uk
Collaboration	• job satisfaction, age, rank, grant, gender, marital status, citizenship, discrimination, collaboration	• The imnpact of research collaboration on scientific productivity Lee, S. & Bozeman, B, 2005 Social Studies of Science 35:673-702 http://sss.sagepub.com/content/35/5/673 • •
• Statistical skills		
statistical skills and research output productivity	• productivity & capacity • building, lack of skills • skills & publication • research resource centre • --?skills productivity, investment --industry workforce skills & productivity -- labour using proxies for skills -- skills intensity, human capital, unit of output --changes in skills groups	• Research outputs from Nigerian tertiary institutions: An empirical study Chiemeke, S. www.webpages.uidaho-edu/~mbolin/chiemeke-longe-shaif.htm • International comparative performance of the UK research.. 2009, https://www.goc.uk/.../11-p123-international-comparative-performance • Statistical computing, Institute for Digital Research and Education, https://idre.ucla.edu/stats ---?The contribution of education to productivity www.educationcounts.govt/nz/publications/..skills..productivity/the-con... --- Skills, workforce characteristics and firm-level productivity 2005, Galindo - Rueda www.citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.188.8512 -- Measurement of government output and productivity for the… www.nzae.org.nz/Adjusting_for_Changes_in_Labour_composition_in_Stat --The effect of immigrants on US employment and productivity Per, G. 2010. www.frbsf.org --- Pblic service productivity www.ons.gov.uk
• Statistical literacy		
statistical know-how and research output productivity	• Impact funds on research productivity • article productivity index • Chptr1 RSS view on stats literacy, chptaer 4/5 RSS def stats literacy references good media	The last two articles in the ulleted section written by statisticians • The impact of performance based research funds on the research productivity .. www.educationcounts.govt.nz • Bio-Statistics: Comparing the productivity and importance of the life span .. 2013 www.ibrc.indiana.edu/ibr/2013/fall/article1.html • Statistical literacy: a review of initiatives 2010, Bolton P, Royal Statistical

	role, prof stats associations, edu inst.s • stats courses not effective, editors demand more stats, stats self-efficacy measure, findings on requirement of stats courses at HEI – for recommendations Chpter 6?, train in discipline, training affects future research ROLE OF STATISTICIANS IN SLA; STATISTICAL assistance figures • Statistical literacy/ common sense is essential in research • stats expertise ---productivity statistics ---productivity & inflation -- statistics-measure of output & value of IT -- statistics on labour productivity --- technology & productivity figures --- statistical offices and productivity figures --- factor productivity statistic --- official productivity statistic	Society, www.parliament.uk/tropics/Statistics-policy.htm • Statistical literacy among applied linguists and SLA researchers 2013, Loewen, S., Lavolette, E., Spino, A.A., Papi, M., Schmidtke, J., Sterling, S & Wolff, D. TESOL Quaterly Aug 2013. http://onlinelibrary.wiley.com/doi/10.1002/tesq.128/full • Journal of Statistics Education 1997, Chance, B.L., 5(3). www.amstat.org/publications/sje/v5n3/chagnce.html • Academic Analytics – Educase, Cambell, J.P. 2007. www.educause.edu/ir/library/pdf/PUB6101.pdf --- Statistics New Zealand, FAQ about productivity, productivity statistics www.stats.govt.nz --productivity, compensation & economic growth, 2013, Sherk, J. www.heritage.org/research/productivity-and-compensation-growth --The productivity paradox of information technology www.ccs.mit/edu/papers/CCSWP130/ccswp130.html --labour productivity and costs – Bureau of statistics productivity ration www.bis.goc/lpc/faqs.htm --- Multi-factor productivity in trucking www.rita.dot.gov/publications/research/productivity/section_05.html --- Productivity – Wikipedia, the free encyclopedia www.en.wikipedia.org/wiki/productivity ---what determines productivity? – 2011 C Syverson, C, 2011, www.home.uchicago.edu/syverson/productivitysurvey.pdf --- Total factor productivity. A short biography – National Bureau of Hutten C.R., 2001 www.nber.org/chapters/c10122.pdf
12.“what support is required to prepare research articles for submission	----- how-to guidelines for authors	• 12.--- only publisher guidelines
• Statistical input		
13.statistical input and successful publication of research findings	---- advertisements for stats services	13.-------- stats units advertising their services • a* http://www.le.ac.uk/jobs/external/MBP00880_Further_Particulars.pdf
14.“statsistical input in articles that publish research findings”		• 14.* http://www.bmj.com/about-bmj/evidence-based-publishing/completed-research • * http://www.nsf.gov/statistics/srs11201/content.cfm?pub_id=1879&id=3 • * http://www.hta.ac.uk/fullmono/mon1408.pdf • * http://en.wikipedia.org/wiki/Academic_publishing
• Statistician researcher/statistician collaboration		
(quantitative) research output productivity and the statistician	•role of biostatistician/ collaboration •communication difficulties/suggestions / keep to stats principles/ do quality research •articles rejected by editor if no stats contribution/collaboration with statistician	• The role of the biostatistician in research, Phillips, S. http://biostats.mc.vanderbilt.edu/SharonPhillips • How can statisticians help psychologists do their work better? 2013 A Gelman, A. 2013 http://andrewgelman.com/2013/05/17/how-can-statisticians-help-psychologists-to-do-research-better/ • statistician qualified to co-author? Sathianm B, Manipal College of Medical Sciences, ResearchGate webpage 2013 http://www.researchgate.net/post/Is_a_statistician_qualified_to_be_a_co_author_in_a_research_paper • ResearchGate webpage 2013, http://www.researchgate.net/post/Is_it_nececessary_to_learn_statistics_for_writing_original_research_articles
• Statistical support services		

research output productivity and statistical (research) support services		•

Question 3: **Does the literature report on developed theory for Factors that affect ROP? (Is further research unnecessary?)** " a model for RO productivity"		
A model for (academic) research (output) productivity - article output	• Kern: model, evaluation of productivity: public policy, research efficiency, productivity, funding • def R Productivity, demographic, academic, institutional indicators of productivity; teach/research preference; collaboration; r training; • Individual, institutional and leadership characteristic that facilitate research productivity - see list • Branajee: model , history of poor research performance :predictive model was developed to identify factors associated with research productivity • • Probit model: Academic rank Research productivity Australia Law • Jung: model, Hong Kong academics, research productivity, academic discipline, CAP data • research and teaching preferences : 3 models, research indexing	• 1. An analytic model for academic research productivity having factors, interactions and implications. Kern 2011. Cancer Biology and Therapy, 12:949-956 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3280913/pdf/cbt-12-949.pdf • Predictors of Research Productivity of Academics, Drennanm J., Politis, Y., Hyde, A. & Clarke, M. ECER Conference 2012 http://www.eera-ecer.de/ecer-programmes/pdf/conference/6/contribution/17081/ human capital; personal preference (attitude); teaching load; academic discipline; demographic; personal; institutional • A theoretical, practical, predictive model of faculty and department research productivity. 2005. Bland, C.J., Center, B.A., Finstrad, D.A. & Risbey, K.R. Academic Medicines, 80(3):225-237, also see Bland et al @ 'productivity' keyword search • Academic Research Productivity: What may be "reining" in the Indian B-School? Arindam Banerjee 2013, Indian Institute of Management Ahmedabad (IIMA) WP no. 2013-06-06. http://www.iimahd.ernet.in/assets/snippets/workingpaperpdf/2009185044 2013-06-06.pdf • Are more senior academic really more research productive than junior academics? Evidence from Australina law schools. Mishara V. & Smyth R. Scientometrics 96:411-425, 2012. http://download.springer.com/static/pdf/960/art%253A10.1007%252Fs11192-012-0886-3.pdf?auth66=1385024117_19a3b6def5f80770d63db5caa488035b&ext=.pdf • Faculty Research Productivity in Hong Kong across Academic Discipline Jisun Jung , 2012, Higher Education Studies, 2(4), Canadahttp://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=6&ved=0CF4QFjAF&url=http%3A%2F%2Fwww.ccsenet.org%2Fjournal%2Findex.php%2Fhes%2Farticle%2Fdownload%2F22562%2F14567&ei=PCOLUtPpNtGp7AbN4YHIBA&usg=AFQjCNHucQgkW-8tRGPa_HKTxaJwt1CZEg • Ramsden, P. & Moses, I. Journal of Higher Education, 23:273-295, 1992: Association between research and teaching in Australian higher education http://download.springer.com/static/pdf/490/art%253A10.1007%252FBF00145017.pdf?auth66=1385024602_4bb1756bb34f776b97dd70fa6bb24886&ext=.pdf
• Relationship/ correlation between factors (towards theory development) Interaction between factors		
article publication the researcher, statistical literacy and the statistician	•	• statistical literacy…. http://www.parliament.uk/briefing-papers/SN05708
research publication researcher, statistical literacy and the statistician	•	• statistical literacy amongst linguists http://onlinelibrary.wiley.com/doi/10.1002/tesq.128/full •
research publication, researchers and statistician	• better research for right reasons/ methodological weakness/career reasons/ publication drive/ill design/ignorance/ethics comm. + statistician/scientific quality=statistician/ stats referee/stats to partake in research/'do' stats	• the scandal of poor medical research 1994 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2539276/pdf/bmj00425-0005.pdf • how can statisticians… http://andrewgelman.com/2013/05/17/how-can-statisticians-help-psychologists-do-their-research-better/ • are statisticians allowed to co-author….. http://www.researchgate.net/post/Is_a_statistician_qualified_to_be_a_co_author_in_a_research_paper_which_he_has_done_the_data_analysis • advertisements

	perception/ •	• is it necessary to learn stats http://www.researchgate.net/post/Is_a_statistician_qualified_to_be_a_co_author_in_a_research_paper_which_he_has_done_the_data_analysis •
Research (output) productivity: contribution of statistician and researcher/ Research output, the researcher and statistician	•Ethical guidelines involves statisticians •def statistics --data access: --- 'canned data' -- output from research - research proposal submission - statistician will issue -market research, sales/service -Advert for Professor, Statistics --data lab guideline -- stats courses advert	•ethical guidelines ASA www.amstat.org/about/ethicalguidelines.cfm •tasks of statistician/ contribute to research www.en.wikipedia.org/wiki/Statistics -- Rothamsted (stats centre) contribute to agri. productivity www.en.wikipedia/wiki/Rothamsted_research --- researchers document IT's positive effect on productivity www.ebusiness.mit.edu/erik/itp.pdf ---The research data centre Program (RDC) www.statcan.gc.ca/rdc-cdr/ -- Statistics Canada www.statcan.gc.ca --Statistics Canada, application for research… www.statcan.gc.ca --Access research micro-data files… www.cso.ie --Market Research Analysts www.bls.gov/ooh/Business-and-Financial/Market-research-analysis.htm -- advertisement www.statslife.org.uk/professor-of-biomedical-statistics-and-statistical-b --Statistics NZ Data Lab output guide www.unece.org/fileadmin/DMA/stats/documents/Topic_3_NZ.pdf -- stats software R covered in the course www.maths.unsw.edu.au/about/statistics-short-courses --- stats tutorial help on statistics www.explorable.com/statistics-tutorial --
role of researcher and statistician in research	• what the statistician does • awareness to the role of stats in research	• the role of the biostatistician in research http://www.mc.vanderbilt.edu/crc/workshop_files/2009-04-03.pdf • http://www.kyforward.com/our-health/2013/03/25/university-of-louisville-researchers-highlight-use-of-statistics-to-promoting-better-health/ • researchers of tomorrow University of Louisville researchers highlight use of statistics to promoting better health http://www.jisc.ac.uk/publications/reports/2012/researchers-of-tomorrow.aspx
17.*****" preparing research for an article the researcher and statistician"		• 17.* http://www.researchgate.net/post/Is_it_necessary_to_learn_statistics_for_writing_original_research_articles_for_publishing_in_high_impact_factor_journals • * http://www.authoraid.info/resource-library/scientific-writing-for-agricultural-research-scientists-a-training-resource-manual • * http://www.theatlantic.com/magazine/archive/2010/11/lies-damned-lies-and-medical-science/308269/ • * (write statistics right) http://sitemaker.umich.edu/rlittle/files/writestatsrev.pdf •
18."preparing research articles/ research process and researcher qualities and skills		• 18.a* Good qualities of academic researhers http://www.science20.com/flexi_chem_teacher/blog/good_qualities_researcher_note_beginners_camilo_tabinas-70065 • a* Skills you need to become a researcher http://www.jobs.ac.uk/careers-advice/working-in-higher-education/1203/5-skills-you-need-to-become-a-researcher • a* Tips for academic writing and research http://blogs.lse.ac.uk/impactofsocialsciences/2012/11/28/lupton-30-tips-writing/ • a* Preparing manuscript for publishing in Psychology journals http://www.apa.org/pubs/authors/new-author-guide.aspx • CV compilation ads ----------

Appendix 2.3

An example of informal study notes on single-event description of factors/ events that impact article publication

Table 2.3
Examples of literature that discuss a single factor that affect the publication of research / article publication/ research output/ delivery of research output

- **Journal editors' influence on ROP**

(D Crane) : editor/ reviewer bias towards authors; academic stratification system controls publication; editors choose selectively; EI, if 'large' affects acceptance; academic affiliation of editor affects publication; knowledge academic affiliations of author; author identity affects acceptance; academic background journal editors; editor's professional age; anonymous evaluation of articles; author age; journal editors; academic characteristics of editors very important; 'genration-style';

- **Numeracy and logical thinking**

(Gibbs GR 2010);
varying quantitative-work benchmark affects research skills; varying degree quant. research methods awareness in soc disciplines (anthropoly to psychology); centrality of quantitative methods awarded to different social sciences disciplines; lack of arithmetic skills; logical skills; numeracy, symbolism, logical skills; (seek further reference to numerical literacy and ROP)

- **Management : Funding/ grant Funding**

(Jacob, BA, and Lefgren, L 2011)
; limited impact of NIH grant funding because research funding market is competitive in US and researchers turn to next funding options – no 'obvious' efficiency – based on investigation on one type of funding (IH) – which does not consider other funding received. Shows it dependent on NIH funding, results more positive; applies to erratic funding – funding in steady supply reveal higher output returns. (Auranen, O and Nieminen, M. 2010) funding environment of universities: competitive funding systems influence ROP: ? in certain countries yes, depending on competitive base – the more competitive the more pproductive; financial incentives boost ROP?; output incentives; competition mechanisms; direct gov. funding v.s. external & industrial funding; how gov. funding differs over countries ; but other factors also affect such as English language speakers

- **Successful mentoring increase ROP**

(Cohen, JG, Sherman, AE., Kiet, TK, Kapp, SD, Osann, K, Chen, L, O'Sullivan, PS, and Chan, JK: 2012);
Quality mentoring increase ROP (hoffman MS & Bordurka, 2009 in Cohen); Mentor programs with accountability features and more research opportunities increase ROP; progress report, menor-report and feedback affect ROP;

- **Attitude**

(Cohen et al); desire to be productive crucial; mentor-mentee relationship very important; research interest; confirmation-biased: pos results make one happy (Fanelli D).

- **Collaboration** (internationally & experienced colleagues), research preference, available research time

(shin, JC, and Cummings, W. 2010) faculty preference (goal orientation and mission) for research affect ROP; international; peer-collaboration affects ROP; see Smeby and Try (2005); Abramo 2008 in Shin. ;
Social network analysis: Collaboration and type of (developed and developing) countries and social networks
Strong collaborative research ties collate with higher ROP (Abassi, A, and Altmannm J. 2011)

- **Positive research results more readily published**

(2009. Fanelli D) scientists are confirmation-baised; NSF database research productivity regression
Career promotion drive increases ROP
(2009: Shapin, S in Fanelli); competitive research environment ook Fanelli, publish or perish-drive

- **Academic inventors who patent research affect ROP**

(V Looy, B, Callaert, J, and Debackere, K. 2006) Academic inventors publish more than their non-inventor academic colleagues at a particular Belgium university. see also Dietz and Bozeman 2005 (in Panamariov and Boardman)

- **Effect of mechanisms (university policy/ management) of university resource centers on ROP; management policy**

(Ponomariov, BL, and Boardman, PC. 2010 613-624) publishing patterns of HEI.s with research centers. Augment scientific and human capital – ability to do research – see Ponomariov and Boardman; build research capacity via resource; this study uses resource centre as a centre that many universities can affiliate with. also see Buchheit, Collins and Collins.

- **Low income countries pu**blish less (Zachariah et al 2010)

Examples in literature that discuss more than one factor/ event that affect the publication of research / article publication/ research output/ delivery of research output

- **Faculty preference (towards world class universities**)

, faculty mission, faculty discipline (type of faculty), time on research, research collaboration affect ROP, biographical attributes, ability to do research, personal preference, attitude, qualifications, workload, research performance, institutional climate, institutional support , (Shin, JC & Cummings, WK. 2010)

- **Collaboration;**

collaboration paradox; internet access to collaborate; professional networks; resource constrained context; desired effect of funding, tech support and program initiatives towards ROP; training; administration policy; Ynalvez, MC, and Shrum, WM. 2011 :205

- **Quality peer researchers** ('quality faculty or department) does not affect ROP. Quality research collaboration networks affect ROP

(Waldinger, F. 2009)

- **Grants; Eng proficiency; etc**

developed/ developing/ industrialized countries different factors; research training; research capaciuty; research preference and interest; research mindedness
(Mushtag, A, Abid, M, andQureshi, MA. 2013?)

- **Teaching loads; research support; longer probation** period; time allocation; teaching preparation; outside consultancy; mentor relationships

(Buchheit, Collins and Collins)

- **Low income countries publish less**

(Zachariah et al 2010) Journal-review rejection fatigue; staff turnover; ethics not cleared; poor writing skills; poor English skills; lack of funding and infrastructure; poor research question formulation and r design

Examples in literature that refer to a statistical perspective on factors/ events that affect the publication of research

- **Social network analysis: Collaboration and type of** (developed and developing) countries and social networks

: ******Research collaboration network: The idea of social

- **Low income countries publish less**

(Zachariah et al 2010) Journal-review rejection fatigue; staff turnover; ethics not cleared; poor writing skills; poor English skills; lack of funding and infrastructure; poor research question

networks towards ROP: should statisticians be included in this beneficial 'social network' collaboration? Strong collaborative research ties collate with higher ROP (Abassi, A, and Altmannm J. 2011)	formulation and r design- see p 9/13 inadequate research experience and research know-how, stats training; how to design, conduct and formulate r questions;
Examples in literature that refer to groups/ categories of factors/ events that affect the publication of research	
• **Faculty/ departmental** preference (towards world class universities), faculty mission, faculty discipline (type of faculty), time on research, research collaboration affect ROP, biographical attributes, ability to do research, personal preference, attitude, qualifications, workload, research performance, institutional climate, institutional support , (Shin, JC & Cummings, WK. 2010) . Groups of research and practice; academic rank and training; demographics; institutional climate; institutional characteristics	• ******Research collaboration network:** The idea of social networks towards ROP: should statisticians be included in this beneficial 'social network' collaboration? Social network analysis: Collaboration and type of (developed and developing) countries and social networks: Strong collaborative research ties collate with higher ROP (Abassi, A, and Altmannm J. 2011) Refer to research questions p3 bottom – can be crucial to publication success.

Appendix 3, Chapter 3

Appendix 3.1
Coding families (Glaser) and proposed simplification of interpretation (Charmaz, Kelle)

Differentiable characteristics of coding families

To address the shortcomings and ease interpretation of Glaser's coding families, Charmaz (2012:63) and Kelle (2007) identify a differentiable characteristic of theoretical coding families, namely "operand" and "operation" concepts. Analogous to relations in mathematics, development of relational links in theory-development requires the components of operand and operation: an entity on which an operation is performed, and an operation/action. This implies "noun" (operand) components and "verb" (operation) components. Using this analogy, Charmaz (2012:63-64) and Kelle's (2007) differentiable characteristic of theoretical coding families falls into place. They proclaim that, when formulating theory as integrated hypothesised relationships, logical operators and subject-specific concepts are required as components of theoretical coding. Therefore, when structuring developing theory it should be recognised that some coding families contain noun or object-construct categories and other categories represent verb or operation categories: logical or relational components. Such object-conceptualisation (Charmaz's "noun" categories) and logical relational code/categories (Charmaz's verb categories) are represented by concepts in a theoretical family, or are represented by the theoretical family in general. Both these "noun" (operator) and "verb" (operand) families are required to build relational links in theory development.

Based on this reasoning, Charmaz (2012:63) and Kelle (2007) divide Glaser's theoretical coding families into:

Analytic families (Charmaz 2012:63) or process families (Munhall 2007:254-255) These are families that imply the "verb" or "operation" component of theory, which Munhall and others refer to as "gerunds" – words ending in 'ing': The six C's family, with elements of causes; context; contingencies; consequences; conditions; covariance; the degree-family; the dimension family; the type family; the interactive family; and the theoretical family.

Major concepts/components of theory (the conceptual topics, or "noun" or "operator" component of theory): the self-identity family; the cultural family; the means-goal family and the consensus family.

Analytic-conceptual combinations of families: for example the unit family with the structural units of group-category (the noun category), along with conceptual/structural categories of family-organisation or hierarchy, territory, societal status and member roles (the verb category). Another example would be the unit family with group or location as structural categories but with categories such as social world, social context, situation, which suggest emerging/ongoing processes or concepts rather than fixed structures. The mainline family is another example of structural concept categories (such as order, or social order categories) and concerns or analytical issues (such as socialisation).

Story-telling/narrative families: the interactive family; the mainline family; the reading family.

When using theoretical code to structure developing theory, Charmaz, Kelle and Munhall indicate that researchers often start off by comparing conceptual substantive code to a

particular theoretical family and as more data, new ideas and information become available (and conceptualisations crystallise more clearly), they move over and 'borrow' ideas from other theoretical coding families, constantly checking to establish whether their data fits the evolving framework-template. For example the six C's theoretical coding family is often the departure point for researchers because the relation-types of cause; consequence and conditions, etc., in this family asks simple relation style questions of emerging categories. [According to Glaser (1978:74), the 6 C's coding family and its sub-family is the theoretical model most commonly used to frame theory development. The 6 C's coding family is the sole coding family that underlies the theoretical coding paradigm of Straussian GTM]. The researcher can then gradually phase-in and investigate the suitability of other theoretical families or elements within these families.

Examples of Theoretical Coding Families adapted from Glaser (1978; 1998; 2005) to illustrate the principle of building a 'store of theories' to enhance theoretical sensitivity

Family of theoretical code (example theoretical frameworks) Themes	This theoretical coding family refers to/ includes categories/ or *concepts* such as:	Description of the theoretical framework	Practical/ empirical examples
Average	tolerance zones; cutting points; centricity ; **Normative model,**	**Normative:** An average of an aggregate of behaviour. Social psychological life is built on averages: average behaviour	• walking survey: Professionals, see own experience good enough to judge issues: "in general the outcome is.."
Basic	Basic structural social process; basic social structural condition; basic social psychological process; basic psychological process	***"Basic social process(BSP)**" which can take either the form of a **basic psychological process** (BSPP refers to processes of becoming or inspiring and is applicable in understanding behaviour; such as becoming a nurse) or **a basic social structural process** (BSSP: concerned with social structures in a process, such as centralization, outsourcing, etc.) **BSP's** are usually core categories and accounts for stages (at least 2) that exhibit different behavioural patterns/change over the periods/ phases; is suited to situation of change/ evolution over time; and are labelled by gerunds ("ing" action) that imply the evolving nature of the process. (Fernandez 2004:88)*	•
Process	Stage; staging; phases; phasing; progression; passages; gradation; transitions; steps; ranks; careers; ordering; trajectories; chains; sequencing; shaping; cycling;	*"A process" is a studied phenomenon that must have at least two stages. Glaser (1978:74) refers to the process family as studying a phenomenon that gets something done that takes time or happens over time.* *Question: "Is the category for example attained in phases or at stages?"*	• Management of distributor relationships ("beginning of the partnership", etc)
Boundary	Edge of life studies Boundary maintaining mechanisms, tolerance zones, front line, transition zones	What goes on at the edge of a unit or social structure - which side of the boundary the action is going on.	• Hospitality rights • off limits areas • deviant actions (embezzle)
Conceptual ordering	Specification of concepts, and in developing properties of categories.	*Specification of concepts, and in developing properties of categories*	• Example is the ordering for motivation generally in the socialization of people: achievement orientation, institutional goal, organizational value, personal motivation • ontological undertones
Consensus	Clusters; agreements; contracts;		• Teamwork

	definitions of situation; uniformities; opinions; conflict; dis-census; differential perceptions; cooperation; non-/ conformity; mutual expectation;		• Labour relations conflict resolution
Cultural	Social norms; social values; social beliefs; social sentiments;	*Cultural family refers to situations where cultural phenomena, like social norms or social beliefs are at stake (Kelle 2005)*	• Initiation ceremonies
The six "C.s"	Causes (complex causal model); context or ambiance; Contingencies; consequences; co-variances; conditions or qualifiers	*The six C's family is concerned with events/ phenomena that deal with (amongst others) causal relationships (Kell 2007:201)*	• political science • causes: sources, reasons, explanations, expected consequence • consequence: outcome, effort, prediction
	Cause	*Cause is the reasons, source or explanation for the occurrence of the phenomenon* *Question: "Is this category a cause/ context or contingency of some other category"*	•
Sub category of "cause?"	Conjunctural causation	***Conjunctural causation**: the difficulty in assessing causal complexity. When an outcome results from several different combination of conditions*	•
	Context	*Context is the ambience in which the phenomenon occurred* *Question: "Is this category a cause/ context or contingency of some other category"*	•
	Contingencies	*Question: "Is this category a cause/ context or contingency of some other category"*	•
	Consequence	*Consequence is the anticipated or unanticipated result of a the phenomenon that is dependent on cause'* *Question: "Is this category a consequence of another category?"*	•
Sub family of "consequence" Means-goal	End; purpose; goal; anticipated consequences; products;	*Sub-family of "consequence": it is an anticipated outcome:* *Question: "Is this category a consequence of another category?"*	
	Co variance	*Co variance is a correlation where one variable changes with another* *Question: "Does this category co-vary with another category?"*	•
	Conditions	*Condition or qualifier is an intervening variable* *Question: "Is this category a condition for another category?"*	•
Cutting point	Boundary; critical juncture; cutting point; turning point; benchmark; division; cleavage; scales; in-out; intra-extra; tolerance levels; dichotomy; trichotomy; polychotomy; deviance; point of no return		• point of no return: drug abuse/ alcoholism
Degree	Limit; range; intensity; extent; amount; polarity; extreme; boundary; rank; grade; probability; possibility; cutting points; critical juncture; exemplar; full; partial; almost; half;	*Degree is the relative positioning of the phenomenon in a continuum (also see "type")* *Degree family relates to the degree of an attribute or property (Kelle 2005)*	
Dimension	Dimension; element; division; piece of; properties of; facet; slice; portion; segment; part; aspect; section;	*Parts of the phenomenon: dividing the whole into parts* *Dimension family refers to situations where the relation between the whole and its elements are of relevance (Kelle 2005)*	Ontological undertones
Interactive	Mutual effects; **reciprocity;** mutual	*"Interactive" is the mutual effects between the*	• **reciprocal** relationship

	trajectory; mutual dependency; interdependence; interaction of effects; face-to-face interaction; self-indications; delayed interaction; symbolic interaction; **amplifying casual looping; traffic interaction**;	*phenomenon and other variables where the temporality of the interaction in not taken into account* *The interactive family does not refer to 'interaction' per se but rather to relations such as mutual effects/ or dependencies, reciprocity; interdependence, etc. (Charmaz 2012:66)* ***A*mplifying casual looping**: as consequences become continual causes and causes continual consequences, worsening conditions or escalating severity is observed **Traffic interaction:** congestion	between cognitive & effective functions of integrity (Barnard 2007?) • economics (amplifying casual looping) • spousal abuse • authority power abuse • organizational failure • falling in love • bullying • communication
Mainline	Social control; recruitment; socialization; stratification; status passage; social organization; social order; social interaction; social mobility; social interaction; social worlds (also see unit family of theoretical category)	*"Mainline" is the societal aspects of the work process such as the social organization, social order, social interactions, etc. This family refers to a wide range of structural concepts and concerns.* *The mainline-label of this family is a vague description and is embedded in the narrative to which it refers in Glaser's 1978 text (1978:76-81). Charmaz 2012:66* An array of structural concepts and concerns	
Means-goal	End; purpose; goal; anticipated consequence; product	*means-end: relation between 'means' applied to reach an 'end/ objective' (Kelle 2005:199)*	
Ordering or elaboration	Structural ordering; temporal ordering (sequential or chronological order); conceptual ordering	temporal	• Structural: organization, division, unit, individual • Conceptual: Institutional goals; organizational value; individual motivation
Paired opposites	In group-out group; manifest-latent; figure-ground; normative-comparative; reduction-substruction; induction-deduction; generative-verificational; unit-concept; 1998: Dichotomies, polar opposites; paired alternatives; 2005: symmetry-asymmetry; binary; micro-macro; **balancing**	*"Balancing" is handling many variables at once in order to start an action, keep an action going or achieve resolution. One gets an equilibrium between all variables*	• In software engineering balance freedom and responsibility/ cross-functionality and specialization/ continuous learning and iteration pressure (to 'deliver'): equilibrium is self-organization (Hoda, Noble & Marshall 2011)
Sub category of paired opposites? Balancing		*"Balancing": dealing with opposite situations: keeping them in equilibrium*	• Balance between hope and despair during preparative waiting phase of terminally ill cancer patients (Giske & Artinian 2007)
			•
Scale	Funnelling down; scaling up; cumulative scale; Guttman scale; Likert scale; **random walk scale**	**Random walk scale**: All variables are in unorganized flux until one crucial variable is introduced and then all variables fall into stable organization	• Meeting of people prior to convener entering • seminars, court, kindergarten gathering • formal order introduced suddenly
Representation	Related to cultural family,		
Reading	Concepts; problems; hypotheses;	*The reading label of this family is a vague description and is embedded in the narrative to which it refers in Glaser's 1978 text (1978:76-81) Charmaz 2012:66*	
Identity self	Self-image, self-concept, self-worth, self-evaluation, identity, social worth; self-realization; transformation of the self; conversions of identity	*Self-image" concerns itself with articulating how everyday communications around the form of what is and is not self-dealing with the theme of the self and self-discovery*	• for example expectations by the researcher that communications about self-identity might well centre around distinctions between self-image and no self-image; or self-worth or no self-worth (social and personal self-worth can further provide a refinement of self-worth)
Unit Identity	Unit identity; **family identity;**	People merge with proper-ties of units they	• Peer pressure

	recreational identity	associate at work & family. People talk of themselves in terms of the units they associate with. Develop unit-identity.	• punk group • professional level • officer in armed forces
Unit	Collective, group, nation; organization; aggregate; situation; context; arena; social world; behaviour pattern; territorial units; society; family; social area; social worlds (see "mainline family/ or theoretical category)'		
Structural functional	Authority structure; reference groups; role sets; status sets; person sets	The necessary requirements for a structure to function Role sets: activities seen as roles associated with one position Person set: number of people who relate to a person in a position	• organizational change given through the authoritative structure • teacher's role set is teach & administer • MD's clientele is person set.
Theoretical	Parsimony; scope; integration; density; conceptual level; relationship to data; relationship to other theory; clarity; fit; relevance; modifiability; utility; condensability; inductive-deductive balance and inter-feeding; multivariate structure; use of theoretical codes; interpretive; explanatory; predictive power;		• Ontological undertones
Structure			•
Type	Type; form; kind; styles; classes; genre;	*Type is a variation of the whole phenomenon(also see "degree")*	• Unisa as ODL being part of the phenomenon of ROP • ontological undertones
Strategy	Strategies; tactics; mechanisms; managed; way; manipulation; manoeuvring; dealing with; handling; goals (=action strategies (Kelle 2007:199)); techniques; ploys; arrangements; dominating; positioning;	*A conscious act to manoeuvre elements associated with the phenomenon* *Strategies: actions/ situations which relate strategizing/ planning/ manoeuvring/ action strategies (Kelle 2005)* *Question: "Is this category a strategy?"*	
Proper-lining , baseline and vaguing out is assumed to refer to type coding family *(See Glaser 1998;9, where proper-lining is referred to as the response participants perceive is proper or appropriate to give – not the correct or honest response but that which their assume to be appropriate. Baseline refers to the most "as is" and honest response – the reality of the situation; Vaguing out refers to responses typified by a participants action not to respond: to be vague about a response, to vague out.*			

Appendix 3.2

Comparison of positivist, modernist/ post-positivist and post-modernist research philosophy

Philosophy	Positivist	Post-positivist/ modernist	Post-modernist
Ontology	Realist / One truth exists World is objective, predictable and truth is objective	Critical/realist (One) True reality exists but cannot be fully understood: the ideal is complete comprehension	**Relativist.** Reality/ truth, * has multiple constructions *is local & specific *is constructed by human intellect *changes
Epistemology	Dualist/objectivist Knowledge of research phenomenon exists independent of researcher Objective knowledge: knowledge of reality is separate from human mind	Modified dualist/objectivist Objectivity an ideal & reality/ knowledge separate from the mind	Transactional/ subjectivist Knowledge, *is constructed *originates in enquirer/ researched interaction *created in real life situations *contextualized
Reason-ing	Deductive Rational, objective, logical	Mostly deductive objectivity an ideal	Subjectivity acknowledged Interpretive
Research method	Method is systematic/ ordered Hypothesis testing	Systematic, qualitative analysis. Natural settings. Triangulate/ verify Data different sources	Relativist, Enquirer involvement Qualitative Naturalistic methods Adaptable/ may change
Aim of research/ objective	Discover findings from data. Confirm hypotheses of emerging theory Control Findings predict events Generalise findings	Disprove hypotheses Control present (less) Findings predict (less) Realistic research env. (everyday reality/ life) knowledge emerges	Construct and interpret reality within a specific context "Knowledge of multiple realities are constructed"

Appendix 4: Chapter 4
Appendix 4.1

Table 4.5: An excerpt of electronic notes on the literature used to prepare the introductory literature review of this study

Table 4.5

Question 1:
How to most aptly label the research Topic_
Research output productivity/ proficiency/ delivery/ academic publishing?

Search keywords or phrases	**Summary of results: usable/ not relevant** • denotes information of relevance -- denotes info not relevant to study	**Web References and articles**
Research output productivity		
1. What is academic research (output) productivity		• 1.Factors that affect academic research productivity http://www.jstor.org/stable/pdfplus/25061660.pdf?acceptTC=true&acceptTC=true&jpdConfirm=true
2.**Research output productivity – articles**	• age, vintage effect, investment motivated, most recent educated • age fellowship • perfectionism • mobility is the key factor *chptr 1 intro, teach load, grant, academic background.human capital, research environment (teaching vs research?biographical attributes: age, qualifications, perfectionism, international exposure, *research environment, *financial factors: funding,financial gain, fellowships) * factors: funding, time, qualifications, research environment, •individual faculty, environment, leader attributes (research environment?) ----Productivity index; -- productivity index	• Research output productivity over the life cycle: Evidence for academic scientists, 1991, the American Economic Review 81(1), 114-132, Levin, S,G. & Stephan, P.E. of .. 1991 (age and financial gain) http://scholar.google.co.za/scholar_url?hl=en&q=http://www.researchgate.net/publication/4980482_Research_Productivity_over_the_Life_Cycle_Evidence_for_Academic_Scientists/file/79e4150ac27080d3e1.pdf&sa=X&scisig=AAGBfm2Z7J_oBmlurKGYvfzA_8y5Fyq3jA&oi=scholarr&ei=DvKFUr3CFI-rhAeR44DoDQ&ved=0CCsQgAMoATAA • Profile and scientific output analysis of physical therapy researchers holding 2013 Sturmer, G. http://www.ncbi.nlm.nih.gov/pubmed/23538457 • *Perfectionist professors have lower research productivity 2011 Charbonneau L, University Affairs (daily). (personality trait) http://www.universityaffairs.ca/perfectionist-professors-have-lower-research-productivity.aspx • *Mobile professors are academically more productive 2011, Plume, A. 2011, The Academic Executive Brief, UK. (travelling increase article publ) http://academicexecutives.elsevier.com/articles/uk-study-reveals-internationally-mobile-researchers-are-significantly-more-productive • Research productivity of Australian academic economists: human-capiutal and fixed effect. Rodgers, J.R. & Neri, F.V. 2007. Australian Economic Papers 46(1),67-87. • *The ombudsman: Factors influencing academic research productivity: A survey of management scientists. Hankock, T., Lane, J., Ray, R. & Glennon, D. 1992, Interfaces, 22(5):26-38 www.jstor.org/stable/25061660 • …2012 http://jetems.scholarlinkresearch.org/articles/Factors%20Affecting%20Research.pdf • *Factors that affect the research productivity of academic staff: the case of the MOi University, Eldoret Journal of Emerging Trends in Economic and Masnagement Sciences 3(5), 475-484, 2012 Sulo, T.,Kendagor, R., Kosgei,D., Tuitoek, D. & Chelangat, S. 2012 Moi Univ Kenya (funds, env, qualify, time) http://jetems.scholarlinkresearch.org/articles/Factors%20Affecting%20Research.pdf • Bland, C.J., Center, B.A., Finstrad, D.A. & Risbey, K.R., Staples, J. 2006. The impact of appointment type on the productivity and commitment of full-time faculty in research and doctoral institutions. The journal of Higher Education, Ohio State University Press, 77(1):89-122. ----2.Index to characterize scientific output productivity 2012(index) Http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1283832/ --A simple generalizable method for measuring individual research productivity, 2013, Wootton, A. www.link.springer.com/article/10.1186%2F1478-4505-11-2

Appendix 4.2

Cross reference tables for each the concepts of Table 4.3 with open code entries that link to a particular concept

Table 4.6: The concept of *attitude* cross tabulated with data events from the literature review data source that suggest attitude

Open code under conceptualCategory code of ATTITUDE (that impact ROP)	Structuring of listed data events to define and densify the suggested category of ATTITUDE	Summary of critical concepts that suggest dimensions of the category or independent conceptualisation
MustUnderstandBasicStatisticalPrinciples	**Attitudes regarding:** • **Statistics** o *Statistical awareness* Statistics important Stats attitude affect productivity o *Statistical knowledgeability* Quantitative/qualitative r types Stats findings have practical application Understand statistics, principles o *Statistical literacy* Stats self-efficacy Technique decisions based on knowledge • **Research role players** Colleagues needed Colleagues own talents • **Research practice** Collaborate colleagues, rewarding, opportunities Research ability/ capability • **Research support, availability** Statistician for analysis, experts available Research resource centres • **Development** Statistics courses needed • **Personal research attitude** Enjoy research, motivated Confidence research ability, statistics Entrepreneurial research approach Research is hard work & involves risks Positive attitude research, statistics	**Attitudes regarding,** • **Personal attitudes** • **Availability resources** • **Statistics** • **Role players** • **Research practice** • **Development**
QuantitativeQualitative		
StatisticianForAnalysis		
StatisticsCoursesNeeded		
StatisticsImportant		
StatsFindingsHavePracticalApplications		
StatsSelfEfficacy		
TechniqueDecisionsBsedONKnowledge		
AttitudeCollaborationConfidence		
AttitudeColleaguesNeede		
AttitudeColleaguesOwnTalent		
AttitudeEnjoyWork		
AttitudeRAbilityConfidence		
AttitudeResearcherEntrepreneurial		
AttitudeUnderstandStatistics		
AttributesResearcherHardWork		
AttributesResearcherRisk		
CollaborateMotiveExtrinsicReward		
CollaborateMotiveOpportunities		
EnjoyResearch		
GeneralStatsAttitudeAffectProductivity		
MotivationProductive		
ResearchNotAppreciated		
ResearcherConfidenceAttitude		
StatisticalConfidence		
StatisticianInSupportResourceCentre		
StatsiticalSelfEfficacy		
ThinkKnowMethod		
ThinkStatsExpertToInterpret		
Total		
Total number of entries = 74		

Table 4.7: The concept of *skills, competencies and attributes* cross tabulated with data events that refer/ suggest *attributes*

Open code under conceptual category of ATTRIBUTES that affect ROP	Structuring of listed data events to define the suggested category of ATTRIBUTES in more detail	A summary of critical concept or sub concepts that suggests dimensions or properties of the relevant category or additional standalone conceptualisation
Coordinate **Leader** **Orderly** **sCurious** **sInitiative** **sIntelligence** **AcademicAffiliationUniversity** **AcademicBackground** **AcademicPredictors** **Age** **AlsoEditor** **AttributesOfStatsBackground** **AttributesResearcher** **AttributesResearcher Creative** **AttributesResearcher Intelligence** **AttributesResearcherAnalyticalMind** **AttributesResearcherAutonomy** **AttributesResearcherCollaborate** **AttributesResearcherCommitment** **AttributesResearcherCommitted** **AttributesResearcherCuiousMind** **AttributesResearcherEnthusiasm** **AttributesResearcherExperience** **AttributesResearcherHardWork** **AttributesResearcherHighEnergy** **AttributesResearcherIndependent** **AttributesResearcherIntrinsicMotivation** **AttributesResearcherKnowledgeable** **AttributesResearcherMotivation** **AttributesResearcherPersevere** **AttributesResearcherRLiterate** **AttributesResearcherSystematic** **AttributesResearcherTenacity** **AttributesResearcherWellTrained** **CareerPPosition** **DisciplineCommunicationCollaboration** **DisciplneNetwork**	**ATTRIBUTES** • **Personal researcher characteristics** Accuracy, coordinate, orderly, systematic, curious, initiative, creative, analytical mind, motivated, enthusiastic, tenacious/ perseverance, research orientated, intelligent, high energy • **Broader researcher characteristics** - Researcher experience & publication experience & research team experience & peer reviewer experience; journal editor as well - Knowledgeability & research literate/ know how & well trained • **Biographical characteristics** - age, professional age - gender - mobility - qualifications/ academic background - academic affiliations - post rank/career position • **Research practice characteristics of researcher** - collaborate, interact with colleagues, communicate, network, participative, interact internationally - committed, hard worker, motivated, autonomous/ independent worker, - research leader - doctoral students - clear on research objectives - research time - research active - sound work habits	**ATTRIBUTES/ CHARACTERISTICS of researchers** • **Intrinsic researcher characteristics** • **Broader researcher characteristics** • **Biographical researcher characteristics** **Characteristics of the research practice of researcher**
DoPeerReview	**ProfessionalAge**	**ResearchPreferenceMoreProlific**
Gender	**QualificationBackground**	**ResearchTime**
LeaderFacilitatesProductivityFeatures	**QualificationQualityQualityPhd**	**ResearcherAttributeTenacity**
Mobility	**QualificationsPhd**	**ResearcherEnvironmentCollaboration**
MoreDoctoralResearchersProductive	**RObjectiveFocus**	**ResearcherEnvironmentInteraction**
Participative	**ResearchActive**	**ResearcherQualifications**
Perfectionism	**ResearchAttributesEffort**	**ResearchersWorkingInternationallyROP**
PhdQualification	**ResearchAttributesWorkHabit**	**Rpreference**
PriorPublishExperience	**ResearchOrientated**	**WorkThinkTogetherOnCreativeIdeas**
PriorResearchTeamExperience	**ResearchPreference**	
Total number of entries: 73		

Table 4.8: The concept of *biographical properties* cross tabulated with data events from the literature review data source that suggest *biographical properties*

Open code under conceptual category of BIOGRAPHICAL PROPERTIES (possible sub category of attributes) that impact ROP	Structuring of listed data events to define the suggested category of BIOGRAPHICAL ATTRIBUTES in more detail	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
AcademicRank **AgeGender** **AgeKnowledgeable** **DemographicPredictors** **Gender** **HighlyQualified** **NetworksDevelopIfSenior** **ProfMostProductiveToPhdLeast** **Qualifications** **academicPosition** **dependents** **gender** **marital**	**Biographical** - Age, gender, dependents, marital status **Broader Characteristics** - Qualifications: highly qualified, at least PhD - Professional status: academic status/ position, senior - Knowledgeable **Research practice characteristics** - more/ better network if senior	• **Biographical characteristics** • **Broader characteristics** • **Research practice characteristics** sub categories of Researcher **CHARACTERISTICS** category?
Total number of entries:13		

Table 4.9: The concept of *collaboration* cross tabulated with data events from the literature review data source that suggest *collaboration*

Open code under conceptual subcategory of COLLABORATION (category research practice?) that impact ROP	Structuring of listed data events to define the suggested subcategory of RESEARCH COLLOBARATION in more detail	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
CoAuthorImpliesNetworks **CoAuthorIsCollaboration** **CollaborateColleaguesAcademicActivity** **Collaboration** **CollaborationInterdisciplinary** **CollaborationNumberResearchers** **CollaborationQualityColleaguesa** **CollaborationResearch** **CollaborationStrategy** **CollaborationStyleInterdisciplinary** **CollaborationStyleMentorOrientated** **CountryDifferencesCollaboration** **InternationalCoAuthorCollaboration** **ResearchPracticeInterdisciplinary** **SharedKnowledgeGivesNewKnowledge** **SharedKnowledgeYieldsNewKnowledge** **StatisticianResearcher** **StimulatesCreativeThought** **UniversityResearchyCentres** **WorkThinkTogetherOnCreativeIdeas**	**How collaborate/ practice to collaborate** - co-author, networks, quality colleagues, international colleagues, interdisciplinary, mentor orientation, resource centres, collect information - **Collaboration outcome** - obtain new information, stimulates thoughts; stimulates creativeness, remain relevant/ up-to-date; directs own research	**Does COLLABORATION form sub category of RESEARCH PRACTICE?**
Total number of events:24		

Table 4.10: The concepts of *communication, data/ or information; training differences; English proficiency; and environment* cross tabulated with data events from the literature review data source that suggest these conceptualisations

Conceptualisation and suggested categories/ subcategories/ properties that impact ROP	**Structuring of listed data events to define the suggested *conceptualisations, categories, subcategories or properties* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
Communication (property of knowledge category/ or research practice category/ or skills category?)		
CommunicationFrequent **FrequentCommunicationTeam**		**Does communication form sub-category of RESEARCH PRACTICE?**
Total number of events: 2		
Data **(**property of research process?)		
DataIntegrity **DataQuality, Data, VerifyData**		**DATA forms part of RESEARCH PROCESS category**
Total number of events: 5		
Training **(**Dimension/ subcategory of knowledge category)		
QualityOfTraining **QuantityOfTraining** **StatisticalEducation**	**Value of training** - quality **Type of training** - research, general, statistical	**Does TRAINING form sub-category of DEVELOPMENT category?**
Total number of events: 6		
Differences (standalone perception but is it of concern to modeling ROP? – can relate to research design?)		
Australia, Differences, Australia, **Differences,. Disciplines, Economy, LAW, Maths** **SomeDisciplinesPublishMore , MorePublish**	**Differences in ROP between** Disciplines Countries Individuals	These type of differences not important to current study? But subject specific/ discipline differences are important to this study: also quantitative/ qualitative/ mixed ?
Total number of events: 9		
English proficiency (subcategory of skills category)		
EnglishProcficiency Skills **EnglishProficiencyPakistan** **EnglishProficiencyCritical**	**ENGLISH PROFICIENCY critical to ROP**	Regard ENGLISH PROFICIENCY a separate category? No, important but a skilll
Total number of events: 3		
Environment (ever present, refer to subcategories that follow in Table 11, 12, 14, 16, 21),		
Australia, Differences, Australia, **Differences, Departments, Institutions, Disciplines, Economy, LAW, Mathematics** **SomeDisciplinesPublishMore , MorePublish**	**The various environments:** • **government;** • **institutional;** • **departmental;** • **editorial;** • **research**	ENVIRONMENTS a category that include, macro, institutional, departmental, editorial, research environments
Total number of events: 9		

Table 4.11: The concept of *department impact* cross tabulated with data events from the literature review data source that suggest *departmental impact*

Open code suggesting the subcategory of *departmental impact* of the *environment* category that impact ROP	**Structuring of listed data events to define the suggested subcategory of *departmental impact* of the *environment* category**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
AccessibleResources **AmpleResearchyTimeAllocation** **AmpleResources** **CollaborationResearch** **CompetitiveEnvironment** **CooperateClimate** **DepartmentSize** **Discipline** **ExperiencedResearchTeams** **FacultImpactMinimizeExternalDemand** **FacultyCharateristics** **FacultyEnvironment** **FacultyImpactColleagues** **FacultyImpactCulture** **FacultyImpactResearchCulture** **FacultyImpactResearchTime** **FacultyImpactSize** **FacultyQualityDifferences** **FacultySupportMentor** **FacultyTeachingMinded** **FundingToDevelopAndResearch** **HaveResearchNetwork** **LeadershipEncourageResearch** **ManageTalent** **MotivateExpectResearchOutput** **MotivateIncentives** **MotivateLessTeach** **MotivateRenumerate** **NeedToPublish** **ParticipativeCulture** **PermanentPostPromotionSalary** **ProfessionalDevelopment** **Promotion**	**Research Culture / Climate of department** - Collaborative; supportive; corporate; motivational attitude; staff with a research preference; culture of research in Department; research leadership in Department; preference for research in the department; teach/ research ration preference of department; - Experienced colleagues; quality colleagues; quality peer colleagues; research minded colleagues; **How Department manage research** • **Support provided by Department** o *Departmental support enabling research:* teach/ research load time-allocation by Dept; assistance from dept re minimal outside disturbance; admin assistance; Dept-size; Dept discipline; student/ staff ratio; management of talent; recruitment policy; Dept. discipline differences o *Motivational support*: incentives; promotion; remuneration; recognition; permanent appointments; promotion o *Physical support*: Provision research resources/ availability; funds; mentors; o *Development/ training/ exposure* support: subject knowledge, statistical, research, professional; o Mentors • **Outcomes/ services expected by dept. (also motivation?)** Performance: Research & teaching	**DEPARTMENTAL IMPACT represents a sub category of the ENVIRONMENT category?** **DEPARTMENTAL IMPACT:** • **Research climate/ culture** • **Support provided directly** • **Support provided via good management/ infra structure** • **Support provided via motivational actions** • **Support provided via expectations**
PromotionLinkPublication	**ResearchLeadership**	**WorkloadPolicy**
QualificationsofStaff	**ResearchMentor**	**attitudeCollegiality**
QualityPeersColleagues	**ResearchPreference**	**attitudeSupport**
Recognition	**ResearchSupport**	**collaboration**
ResearchClimate	**ResearchTimeLimited**	**motivateProbationPeriod**
ResearchCulture	**SnrPeerColleagues**	**policyRecruit**
ResearchEmphasisPreference	**StudentStaffRatio**	**teachResearchLoad**
ResearchIncentives	**TeachResearchLoad**	**timeAllocation**
	WorkLoadModels	**trainReseach**
Total number of events: 61		

Table 4.12: The concept of *editorial environment/ impact* cross tabulated with data events from the literature review data source that suggest *an editorial effect*

Open code under conceptual subcategory, EDITORIAL IMPACT of *environment* category that impact ROP	**Structuring of listed data events to define the suggested subcategory of *editorial environment/ vantage point* in more detail**	A summary of critial concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
AcademicAffiliationUniversityReviewer **AcademicAgeEditor** **AcademicBackGroundReviewerEditor** **AcademicStratificationSystemJournal** **AssumedKnowledgeCauseDifficultyReview** **BiasRECountriesPakistabMedicalEditor** **CountryBias** **EditImpact** **EvaluateAsNetworkOfCollaboratorsDo** **ExperiencePeerReviewComments** **HighlyRatedInstitution** **QualificationsPhd** **ReviewerQualifications** **StatisticalLiteracyRequired** **StatsStandardIndicatedByEditor** **TrainedInOthodoxMethodsKnown** **TrainingMethodSensitivity** **TrainingTheorOrientation** **TrainingWritingStyle**	**Qualifications** - of editor; reviewer; author; **Experience/ knowledge**; - in reviewing; stats literacy; methodology; theory **Affiliations/ bias factors** - University; country; academic background; networks; rating of institution; specific methodology; theoretical orientation; writing style **Policy** - stratification **Editorial process ?**	**EDITORIAL IMPACT represents a sub category of the ENVIRONMENT category?** **EDITORIAL IMPACT:** • **Qualification** • **Bias factors** • **Policy** • **Knowledge/ experience** • **Editorial process** Important issues missing here? Refer to field notes
Total number of events: 19		

Table 4.13: The concept of *experience* cross tabulated with data events from the literature review data source that suggest *an experience subcategory (of the knowledge category?)*

Open code under conceptual sub-category of *Experience* that impact ROP *(* a subcategory of the knowledge category?)	**Structuring of listed data events to define the suggested category of ATTITUDE in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
CoauthorshipJnrColleagues **ExperienceGained** **ExperienceInResearch** **ExposureSnrColleagueNetwork** **KNowPublicationProcess** **LeaderExperienceInResearch** **OtherExperienceInResearch** **experience**	**How obtain experience** - Exposure to research; include jnr researchers; experienced research leader; co-authorship; research mentor; exposure to research networks; **Type of experience** - research; publications	EXPERIENCE forms a distinct category or subcategory of knowledge , because experience implies gained/ attained knowledge
Total = 8		

Table 4.15: The concept of *knowledge* cross tabulated with data events from the literature review data source that suggest a *knowledge* category

Open code under conceptual category of *knowledge* that impact ROP	**Structuring of listed data events to define the suggested category of *knowledge* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
AdvancedStatsKnowledgeRequired **BasicStatsKnowledgeRequired** **InferentialStatsKnowledgeRequired** **KnowledgeAccess** **KnowledgeResearch** **ResearcherKnowledgeSubjectFieldExp** **StatsKnowledgeRequired** **StatsKnowledgeRequirementForResearch** **StatsKnowledgeResearchDesigns**	• **Type of knowledge** - statistical knowledge; research knowledge; subject specific knowledge; experience • **Extent of knowledge** – statistical: advanced; inferential; research design • **Access to knowledge**	**KNOWLEDGE** a separate concept • **Type of knowledge** • **Extent of knowledge** • **Access to knowledge**
Total number of events: 9		

Table 4.14: The concept of *institutional impact* cross tabulated with data events from the literature review data source that suggest *an institutional* vantage point as subcategory of *environment*

Open code under conceptual subcategory of *institutional environment* that impact ROP	**Structuring of listed data events to define the suggested subcategory of *institutional environment***	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
FavourableEnvironment **Funding** **FundingTODevelopAndResearch** **HumanCapacity** **InstitutionAttributess** **InstitutionCharacteristicsAffectProductivity** **InstitutionImpact** **InstitutionImpactDoRightResearch** **InstitutionImpactFund** **InstitutionImpactLeadership** **InstitutionImpactPeopleFocus** **InstitutionImpactPerformance** **InstitutionImpactResearchManagement** **InstitutionImpactResearcherNeeds** **InstitutionImpactResources** **InstitutionImpactRightResearchers** **InstitutionImpactTalentNeede** **InstitutionImpactUseOursideSources** **InstitutionImpactWhatResearch**	• **Research Culture/ Climate ;** - Leadership; vision & mission directed towards research; research/ teaching preference - Respected, quality research institution; institutional characteristics • **Institutional support** - HR, staff capacity; right appointments; funding; research resources; research infrastructure; manageable teaching loads; time to do research - development; people focus • **manage** - research; human capacity; right researchers; performance; talent management; manage which research should be focused on, what should be researched; research policies; manage (correct/ appropriate/ relevant) appointments; recruitment policies; - performance; researcher needs; • **Policies**	
InstitutionInpatRespectedIcnst	**ReseachSupport**	**SupportManagement**
InstitutionQuality	**ResearchCapacity**	**TeachLoad**
InstitutionTeachingMinded	**ResearchInfraStructure**	**Time**
LackResearchInfrastructure	**ResearchSupport**	**UniversityResearchCulture**
PoliciesThatRestrict	**ResearchUniversities**	**mission**
PrestigeousResearchInstitute	**ResearchUniversity**	**resourceConstrained**
QualityInstitutions	**StaffRecruitement**	1
Total number of events: 40		

Table 4.16: The concept of *a global/ governmental impact* cross tabulated with data events from the literature review data source that suggest a *global/ governmental perspective (*sunactegory of *environment* category)

Open code under conceptual subcategory, *global/ government environment of environment* category that impact ROP	**Structuring of listed data events to define the suggested subcategory, *global environment* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
CountrySomePublishMore **OtherFactorsGovernments** **UrduLanguagePakistanEnglishProficiency** **developingCountry**	• **Types of sub-environments within macro environment** - countries; governments; languages	MACROENBVIRONMENT part of ENVIRONMENT category
Total number of responses: 4		

Table 4.17: The concept of *management* cross tabulated with data events from the literature review data source that suggest *a managerial impact* (subcategory of *role players?)*

Open code under conceptual (sub?) category of *management* that affects ROP	**Structuring of open code to define the category/ sub category of *management* in more detail**	Summary concept/ sub concepts which suggest Categories & subcategories/ dimensions/
Promotion **Recognition** **ResearchTimeLimited**	• **Facilitates research** - provides time; recognition; motivation	MANAGEMENT separate concept? • facilitator' role player in research: Should regard as subcategory of role players?
Total number of events: 3		

Table 4.18: The concept of *motivation* cross tabulated with data events from the literature review data source that suggest a *motivational* category

Open code under conceptual category of *motivation that* impact ROP	**Structuring of listed data events to define the suggested category of *motivation* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
Acclaim	• **Type of motivation** - recognition; promotion; research awards; financial rewards; incentives; promotion; • **How motivated/ motivation practice** - examples of productive peers; increase incentives; IPMS requirement; by defining personal goals; ease research administration;	MOTIVATION a separate concept?
CareerPromotion		
CountryImpactIncentivesOutcome		
ExampleProductivePeers		
ExcellanceAwards		
Financial		
FromGovernment		
Incentives		
IncentivesIncreaseROP		
MonitorResearchMotivateComplete		
Motivation		
NeedToPublish	**Recognition**	**TeachingPreferenceCountry**
PerformanceManagement	**ResearcherPersonalGoals**	**TooMuchTimeApplyFunds**
Promotion	**TakesTimeToApplyAdminister**	1
Total number of events: 20		

Table 4.19: The concept of *publication savvy* cross tabulated with data events from the literature review data source that suggest *publication savvy* (a subcategory of the *knowledge* category?)

Open code under conceptual subcategory, *publication savvy* of the *knowledge* category that impact ROP	**Structuring of listed data events to define the suggested subcategory, *publication savvy* of the *knowledge category* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
ContributeNewKNowledge	• **Insight re what research journals publish** - novelty value; innovative research; contributes new knowledge; knowledge advancement; confirmatory research; • **Experienced** - respond properly to reviewer comments	PUBLICATION SAVVY a separate concept? (but implies acquired knowledge?) • **Insight re what is publishable** • **Experience submission process**
ExperiencePeerReviewComments		
InnovativeResearch		
PositiveResults		
PublicationSavvyConfirmatoryResearch		
PublicationSavvyKnowledgeAdvancement		
PublicationSavvyNovelty		
Total no of events:7		

Table 4.20: The concepts of *funding, human resources, information access, internet access, methodology, research climate, research resource centres and research mindedness* cross tabulated with data events from the literature review data source that suggest these conceptualisations

Conceptualisation and suggested categories/ subcategories/ properties that impact ROP	**Structuring of listed data events to define the suggested *conceptualisations, categories, subcategories or properties* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
Quality of training		**DEVELOPMENT separate category? See TRAINING**
Statistical education		
FUNDING		
Total =4	(subcategory of research resources category)	
Funding		**FUNDING part of RESOURCES category**
FundingKeniaCountries		
HUMAN RESOURCES		
Total =3	(subcategory/ property of research climate category)	
Human capacity	**Value of training** - quality **Type of training** - research, general, statistical	**HUMAN RESOURCES management part of RESOURCES/ INSTITUTIONAL/ DEPARTMENTAL categories?**
RetentionStrategy		
StaffRecruitement		
INFORMATION ACCESS		
Total =3	(subcategory/ property of *research climate* category)	
informationAccess		INFORMATION ACCESS part of KNOWLEDGE category?
InformationResourcesAvailable		
INTERNET ACCESS		
Total =4	(subcategory/ property of *research climate* category)	
InternetAccessJapan		Part of Research RESOURCES/ research climate
InternetAccessAvailable		
Methodology		
Total =5	(subcategory/ property of *research process* category)	
Knowledgeable		METHODOLOGY part of sub category of PLANNING/DESIGN of the RESEARCH PROCESS category
ClearOnDirectionOfResearch		
MethodAssumptions		
Management/ research climate		
Total =4	(subcategory/ property of *research climate* category)	
Promotion		MANAGEMENT separate category or part of INSTITUTIONAL/ DEPARTMENTAL sub-categories of ENVIRONMENT?
Recognition		
HumanResources		
Research resource centres		
Total =4	(subcategory of *research resources or* stand alone category?)	
NeedForResearchResourceCentres		RESEARCH CENTRE different from RESOURCE CENTRES
ResearchCentresVSResourceCenter		
IncreaseROP		RESEARCH CENTRE different from RESOURCE CENTRES
NumeracyFacilitiesResourceCentre		
Research mindedness		
Total =2	(subcategory/ property of *knowledge* category)	
ThinkResearch		RESEARCH MINDEDNESS component of RESEARCH LITERACY
ResearchMinded		

Table 4.21: The concept of *research/ researcher environment* cross tabulated with data events from the literature review data source that a *researcher environment* subcategory

Open code under the conceptual subcategory, *researcher environment* of the *environment* category that impact ROP	**Structuring of listed data events to define the suggested subcategory, *researcher environment* of the *environment category* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
Accountability	• **Research Climate** - favourable climate; motivational approach; quality/ research university/ institution; morale aspects; supportive culture; open- minded approach; research-recognized department; research autonomy; good information flow in dept/ institution; research-productive environment; good relationships; participative approach • **Research practice** - *communication*: interact w colleagues; research networks; information exchange; information flow; - *exposure* to research; exposure to jnr./ snr. colleagues; - *support base:* research mentors; colleagues; mentor; research teams; - *interdisciplinary, international o* research approach • **Research role players & roles** - role players: researcher; research team; co-researcher; statistician; colleagues; department management; - researchers have role responsibilities; • **Research *support*** – *direct* support: funds; resources; equipment; technology; communication - *indirect support:* time; research capacity; mentor; • **Development (how: practice & type)** - type: research competence; formal theory; professional development; statistical insight; research practice; - how: exposure; training; hands on; mentor; • **Requirements** - knowledgeability; statistical literacy; statistical thinking; • **Managing research** - *infrastructure*: available research time; teach load; supervision; remuneration; resources; research capacity; supervision; incentives; research administration to be done independently; appointments; post benefits; - *researcher needs/ resources*	RESEARCH ENVIRONMENT sub-category of ENVIRONMENT: • Research climate • Research support; • Management impact • Development impact • Research practice impact • Research role (part of research practice?? impact • Research role players • Researcher attributes (not all events entered in the middle column – but concepts id.d above based on all events)
AmpleResearchyTimeAllocation		**SpendLimitedTimeAdmin**
AmpleResources		**StatisticalLiteracyRequired**
AppointmtsContractNoAcadContinuity		**StatsTrainingRequired**
ByExposureToResearch		**StatsiticalThinking**
CoauthorshipJnrColleagues		**StudentMentorRelationsJapan**
CountryDifferences		**SupervisionAdminControl**
CreateFavourableResearchEnvironment		**SupervisionHumanControl**
DevelopResearchCompetence		**SupportCulture**
DisciplineDifferences		**SupportOrganizeResearch**
ElementMotivation		**SupportResources**
ExposureSnrColleagueNetwork		
FacultyImpactResearchUniv		
FacultySupportEnvironment		
FacultySupportFund		
FormalTheoryUS		
FundingByAgencyUsaNotImpactROP		
FundsResearch		
HandsOnJapan		
HaveResearchNetwork		
INfoiFLowCommunication		
IfAvailableNotIncreaseROP		
Incentives		
IndependentResearchUS		
InfoFlowFrequentCommunication		
InformationExchange		
InteractionColleague		
InterdisciplinaryEnvironment		
LeaderCharacteristics		
LeaderKnowledgeableOnDetail		
MoralePersonalGoals		
MoreToDoResearchWork		
MustItBeCompetitive		
NoResearchCapacityPakistanFaculty		
NoResearchMentorPakistan		
NoResearchTrainingFundsPakistan		
NoResearchTrainingPakistan		
OrgEnvInformationFlow	**ResearchTeamworkCountry**	**SupportTechnology**
OrgEnvInvolvement	**ResearcherENvironmentAutonomy**	**TeachLoad**
OrgEnvMeetings	**ResearcherEnvironemntDeptSize**	**TeamworkCommunication**
OrgEnvMorale	**ResearcherEnvironment**	**TeamworkDisputResolution**
OrgEnvSupervision	**ResearcherEnvironmentEquipment**	**TeamworkLeadership**
OrganizationalCulture	**ResearcherEnvironmentINstSupport**	**TeamworkPositiveGroupClimate**
ProductiveEnvironment	**ResearcherEnvironmentInteractionColleagues**	**TeamworkPositiveGrpMembership**
ProductiveResearchEnvironment	**ResearcherEnvironmentLeadership**	**TeamworkProblemSolving**
ProfessionalDevelopment	**ResearcherEnvironmentMorale**	**TeanworkInterpersonalRelations**
QualityAppointments	**ResearcherEnvironmentOpenMinded**	**TimeConsuming**
QualityPeersColleagues	**ResearcherEnvironmentQualityAppointments**	**TimeOnResearch**
Relationship	**ResearcherEnvironmentRecognizedFaculty**	**TrainHowTODoResearchCourses**
ResearchClimate	**ResearcherEnvironmentResearchDriven**	**TrainDisciplineSpecificStatsManual**
ResearchCulture	**ResearcherEnvironmentResearchTime**	**TrainingRequired**
ResearchEnvironmentParticipatory	**ResearcherEnvironmentTim; teach load**	**UnderpaidNoMotivationPakistan**
ResearchIncentives	**SameInterest**	**WorkLoadModels**
ResearchMentor	**SharedKnowledgeGrows**	**YearExposureProgram**
ResearchOrganization	**SocialSkillsJapan**	**responsibility**
Total number of events: 102		

Table 4.22: The concept of *research practice* cross tabulated with data events from the literature review data source that suggest research practice

Open code under the conceptual category, *research practice* category that impact ROP (rather resort under research process category?)	**Structuring of listed data events to define the suggested category, *research practice* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
AttributesGeniusLeaderSeeNeeds	Various practices • **Collaborate** - methods: Research teams; networks; co-authorship; international; interdisciplinary; consult, internet; • **Ethical conduct** - do ethical research/ ethical practices - ethical clearance; Ethical conduct - guard ethical ignorance/ create awareness • doing research -; work habits • **Characteristics of research practices:** - different research **style**; - **teams:** good team forms/ develops genius; require experienced leader; members talented; good attitude re research; participative; teams - research knowledgeable	Is RESEARCH PRACTICE a separate concept or part of the research process? collaboration/ partnership/ teamwork/
AttributesResearcherRPractive		
AttributessGeniusFocued		
AttributessGeniusGroupDevelopEachOther		
AttributessGeniusIndivTalent		
AttributessGeniusOptimistic		
AttributessGeniusQualityLeader		
AttributessGeniusQualityResearchers		
AttributessGeniusRightPositionMembers		
AttributessGeniusWorkTogether		
CoAuthorImpliesNetworks		
CoAuthorImpliesTeamwork		
CollaborateExtrinsicReward		
CollaborateOpportunities		
Collaboration		
CollaorationInternet		
ContributeNewKNowledge		
EthicalResearch	**InternationalCollaboration; collaboration**	**ResearchTeamworkIDCollectiveGenius**
EthicsOrIgnorance	**Multidisciplinary**	**ResearchrContrlExtraConsultNegativeImpct**
ExperiencedCoResearchers	**NoInternetAccessCollaborationPakistan**	**WayOfDoingResearch**
GroupFormsGenius	**ResearchPractice**	**WorkHabits**
ImplementResearchDoResearch	**ResearchPracticePosResults**	**EthicalMedicaltrailIssuesPakistan**
Innovative	**ResearchStyle**	**networks**
Total no of events: 38		

Table 4.23: The concept of *research process* cross tabulated with data events from the literature review data source that suggest *research process*

Open code under the conceptual category, *research process* category that impact ROP	**Structuring of listed data events to define the suggested category, *research process* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
Analysis	**Research process involves** • **Formulate research objectives & questions** **- clear on direction; formulate objectives;** • **Plan & design** - sampling; knowledge research design; insight paradigm; methods; analysis strategy; scientific condition; • **Execute & collect** - analysis; do research**;** • **Analyse & interpret** - interpret; quality; accuracy; process data; wrong interpretation; • **Write-up & submit** - manuscript preparation; write-up; **Role players in research process** • **Who they are** - team leader; statistician; n • **responsibilities** - ethical conduct; correct application; think logically	RESEARCH PROCESS is critical category of ROP
ClearOnDirectionOfResearch		
DataQualityAffectQualityResearch		
Design		
DesignPhaseResearchProcess		
FormulateObjectives		
ImplementResearchDoResearch		
InsightParadigmsMethods		
Interpret		
ProcessRelateToQuality		
ResearchDesignSelection		
ResearchLeader		
ResearchProcessAnalysisAccuracy		
ResearchProcessAnalysisStrategy		
ResearchProcessData		
ResearchProcessEthicalAspects		
ResearchProcessInterpretatiom		
ResearchProcessLogicalThinking		
ResearchProcessManuscriptPreparation		
ResearchProcessSamplingEtc		
ResearchQuality		
ResearchQuestionFormulation	**StatisticianAsResearchTeamMember**	**WriteUp**
ResearcherresponsibilityReRProcess	**StatisticianThroughoutResearchProcess**	**WrongApplication**
ScientificCondtinsLinkToResearchProcess	**StatsKnowledgeResearchDesigns**	
Total no of events: 29		

Table 4.24: The concept of *research resources* cross tabulated with data events from the literature review data source that suggest the concept of *research resources*

Open code under the conceptual category, *research resources* category that impact ROP	Structuring of listed data events to define the suggested category, *research resourceses* in more detail	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
AccessibleAvailable	• **Type of resources** **-** communication resources - funding - training/ development - resource centre & support services; consulting; analysis services; - IT resources software packages; IT; • **Properties of resources** - available - quality	Research resources separate concept/ category or part of RESEARCH ENVIRONMENT sub category or part of RESEARCH PROCESS category?
CommunicationResourcesAvailable		
ExperiencedCoResearchers		
Fundins		
ImportanceOfIT		
MustItBeAvailable		
RequireResourcesTOResearch		
ResearchAssistants		
ResearchResourceCenre		
ResearchResourceCentre		
ResearchResourceCentreElectronic	**ResourcesExcellent**	**StatisticianStatisticalAnalysis**
ResearchResources	**StatisticalSoftwarePackages**	**Technical; training**
ResearchSupportServices	**StatisticalSorftware**	**ThinkKnowMethod**
ResourcesAssessible	**StatisticianConsulting**	**ThinkStatsExpertToInterpret**
Total no of events: 24		

Table 4.25: The concept of *research role players* cross tabulated with data events from the literature review data source that suggest the concept of *research role players*

Open code under the conceptual category, *research role players* category that impact ROP	Structuring of listed data events to define the suggested category, *research role players* in more detail	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
COAuthorWithOneOrManyInGroup	• **Players** **- co-researchers; team members; research leader; colleagues; mentors; statistician; co-authors; managers** • **Function/ role** - mentor; write; co-author; attend to ethics; carry unique responsibilities; attend to stats; consult; analysis strategy; analyse; interpret; coordinate research; team members participate; are subject knowledgeable; are knowledgeable on research practice; leader experienced in research; provide resources	**ROLE PLAYERS forms part/ sub category? of RESEARCH PROCESS category?** **Role players** • **Certain members/ players** • **Certain responsibilities** • **closer to/ further removed from the research process**
Coauthor		
DesignPhaseResearchProcess		
EthicsCommitteeStatistician		
LeaderCharacteristics		
Mentor		
NeedStatistician		
PartResearchteam		
RLeaderCreatesParticipativeApproach		
RLeaderExperiencedResearcher		
RLeaderHasResearchPreference		
RLeaderStaysFocusOnGoal		
ResearchMentor		
ResearchProcessAnalysisStrategyStatian	**ResearcherQuality**	**StatisticianThroughoutResearchProcess**
ResearchProcessEthicalAspectsCommittee	**ResearcherresponsibilityToRProcess**	**TeamLeaderCoordinateResearch**
ResearchProcessInterpretationStatistician	**SnrPeerColleagues**	**TeamLeaderInformedResearch**
ResearchProcessManuscriptPreparation	**StatisticianAsResearchTeamMember**	**TeamLeaderKnowTechnicalDetail**
ResearchProcessSamplingEtc	**StatisticianConsulting**	**TeamLeaderResourcesRequiredProvide**
ResearchQualityStatistician	**StatisticianIsTeammember**	**ManagementReseachClimate**
ResearchTeamsAppropriateSelected	**StatisticianStatisticalAnalysis**	
Total no of events: 32		

Table 4.26: The concept of *research teams* cross tabulated with data events from the literature review data source that suggest the concept of *research teams*

Open code under the conceptual category, *research teams* category that impact ROP	Structuring of listed data events to define the suggested category, *research process* in more detail	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
AttributesGeniusLeaderSeeNeeds	• Characyteristics	RESEARCH TEAMS/ role players the same sub category? In a sense but also a research practice?
AttributessGeniusFocued		
GeniusGroupDevelopaEachOtherCreates		
AttributessGeniusIndivTalent		
AttributessGeniusOptimistic		
AttributessGeniusQualityLeader	**AttributessGeniusQualityResearchers**	**AttributessGeniusRightPositionMembers**
CoAuthorImpliesTeamwork	**GroupFormsGenius**	**AttributessGeniusWorkTogether**
EffectiveTeamsGetResults	**ResearchTeamLeaderExpert**	**ResearchTeamworkIDCollectiveGenius**
ExperiencedCoResearchers	**ResearchTeamQuality**	**TeamworkCooperation**
Total no of events: 18		

Table 4.27: The concept of *research skills* cross tabulated with data events from the literature review data source that suggest a concept of research/researcher skills

Open code under the conceptual category, *research/researcher skills* category that impact ROP (skills, abilities, attributes one category?)	**Structuring of listed data events to define the suggested category, *research skills* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
AbilitiesRelatedToDoingResearch	• **Types of skills** - *research skills*; research competence (correct data; etc); statistical skills (stats thinking, stats reasoning;); technology skills (IT & software packages); numeracy skills; - *skills to manage/ coordinate research*: communion skills (skills to transfer knowledge; language skills; reporting skills; writing skills); social skills; professional skills;	RESEARCH SKILLS is a separate/ independent category
AbilityDoResearch		
AbilitySkillTheSame?		
AbilityToDoResearch		
Communication		
DevelopResearchCompetence		
KnowledgeTransfer		
LanguageSkills		
ManageResearchImplementation		
Management		
Numeracy	**ResearcherSkillsCommunication**	**StatsReasoning**
NumeracySkills	**ResearcherSkillsReportWriting**	**Technology**
ProblemSolvingSkillsRequired	**ResearcherSkillsSocialSkills**	**TechnologyKnowledge**
ReportingSkills	**ResearcherSkillsTalentExceptional**	**ThinkCheckData**
RequiredSkill	**ResearcherSkillsWriting**	**ThinkCheckQuality**
ResearchSkills	**SatsLiteracy**	**ThinkDeclareVariation**
ResearcherCompetencies	**Skills**	**ThinkHowData**
ResearcherExpertise	**SocialSkills**	**ThinkIDVariables**
ResearcherProfessionalSkills	**SomeoneToComplete**	**ThinkSpecificMethods**
ResearcherSkillRManagement	**StatisticalThinking**	**ThinkUnceratinty**
RskillsCommunicateUnderstandably	**StatisticalThinkingHabits**	**ThinkVariation' which data**
Total no of events: 47		

Table 4.28: The concepts of *statistical awareness, statistical literacy and statistical training* cross tabulated with data events from the literature review data source that suggest these conceptualisations

Conceptualisation and suggested categories/ subcategories/ properties that impact ROP	**Structuring of listed data events to define the suggested *conceptualisations, categories, subcategories or properties* in more detail**	A summary of critical concept or sub concepts that suggests dimensions or properties of the category or standalone conceptualisation
n = 3	**Statistical awareness** (subcategory of *Knowledge* category?)	
StatisticalAwareness		
StatisticalLiteracyAwareness		
n = 7	**Statistical literacy** (subcategory of *Knowledge* category?);	
AppropriateMethod		**Stats awareness, literacy, reasoning, thinking represent dimensions of STATISTICAL COMPETENCE??**
IgnoranceIncorrectConclusions		
IgnoranceMisinterpretResults		
ResearchQuestionFormulation	**InterpretationResults &StatsSoftwarePackages**	**StatisticalLiteracy**
n = 3	**Statistical thinking** (subcategory of skills category?)	
StatisticalThinkingAllData		
StatisticalThinkingComparison		

Appendix 4.3

Open-ended questionnaire for managers

(Similar questionnaires worded for researchers, statisticians, peer reviewers and journal editors were also administered)

Research output productivity (article publication)
Open-ended questionnaire to managers

UNISA, College of Graduate Studies,
School of Interdisciplinary Research and Graduate Studies.

Re: A request for your input in a research study on *factors that affect research output delivery* (article publication) in accredited journals

Dear Research Participant

Thank you for your willingness to participate. This questionnaire is designed to learn from your experience – in your capacity as a manager with research interests – about the process that underlies article publication in accredited journals. The objective in this regard is to develop a theoretical model on ***factors that affect research output productivity***. (Research output productivity in this study is understood to be the publication of research findings).To this end a grounded theory approach is followed. Interest in this field originated from 15 (+ 9) years experience as a consulting statistician to academic researchers that develop and publish their research. Over this period, informal observation (from a statistical perspective) suggests that various factors affect the publication of research findings.

As an initial step towards theory generation, I therefore approach you, in your capacity as a **manager** to assist in understanding the dynamics that underlie research publication right from the conception phase of a study. The lived experiences of research managers (and other interest groups) are invaluable in enriching the study and providing information on broad issues that impact the research process and thus the final delivery of research output. (For example, institutional policy on research preference and flagships can, and do, affect research direction). Once an overall view of the substantive area has been gleaned – from your kindly supplied knowledge & experience, and, that of the existing literature and other resources – the research and theory will be delimited and refined in further theoretical sampling and analyses steps.

Note:

- Please evaluate the questions from your perspective as a manager with research interests
- The questions are intended to stimulate your thoughts, please jot down your own experience wherever you find applicable – please indicate issues that you feel have been overlooked.
- Participation is voluntary and absolutely anonymous. Data will be saved in encrypted format and accessible only to the researcher. You may choose to opt out at any given time or refrain from answering a specific question. However, your experience will contribute greatly towards suggesting measures to improve research productivity. Completion of the questionnaire will indicate your consent to participate.
- This research has been cleared by the Ethics Committee of the UNISA CEDU and complies with the ethics principles set out in the UNISA Research Ethics Policy Document of 22-06-2012
- I am currently enrolled for a doctoral study at UNISA with the registered research topic of: **Fac*tors that affect the production of research output (published articles) in accredited journals***.

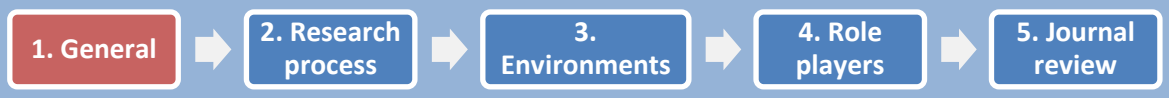
I thank you kindly

Hélène Müller (mulleh@UNISA.ac.za, office: 012-4293965)
Prof Paul Prinsloo, supervisor (Research Professor, UNISA CEMS)

Factors that affect research output productivity (publication of articles)

Section 1: Biographical information

The questionnaire asks general research related information from participants in Section 1, while Sections 2 – 5 probe issues related to the research process (which produce research findings to be published); environments that link to & impact the research environment and role players that have the potential to impact the publication of research; as well as the review process & peer reviewers as final role players in article publication



Please tick the appropriate box and elaborate where necessary

1. Please indicate the research field that you feel most comfortable with

i. Education		ii. Law	
iii. Science, engineering, technology		iv. Human Sciences	
v. Law		vi. Agriculture & Environment	
vii. Human Sciences		viii.	
If "other" please indicate field of research:			

2. How would you rate your English proficiency and ability to report/ evaluate research findings in English

2.Fluent/ very good	
3. Good	
4. Average	
5. Poor	
6.Very poor	

3. Do you regard yourself as a person with extensive research experience?

i. Extensive research experience	
ii. Reasonable amount of experience	
iii. Limited research experience	

4. Do you believe that a person's perception of '*what affects research publication/ article publication*' is influenced by his/her in vantage point? (e.g. being a researcher, statisticians, faculty managers, journal editor, etc)

i. Absolutely	
ii. To some extent	
iii. I am undecided	
iv. I doubt it	
v. Definitely not	
vi. Comment?	

5. Why are you, as a manager with research interests, concerned about research output productivity (Number of published articles)?

Please indicate

6. Which research design-type do you feel most comfortable with in research activities that you manage or conduct yourself:

1. Quantitative research design	
2. Qualitative research design	
3. Mixed methods research design	
4. Other	
If "other" please indicate type of research:	

7. **Do you as a manager - who also publish articles - prefer to publish solo (not co-authored publications)?**

1. Yes	
2. No	

8. In your capacity of manager please indicate the type and extent of statistical services deemed necessary to delivery a quality article.

Extent legend: 1: not at all; 2: perhaps; 3: 50/50 (do use but able to cope solo); 4: to a great extent; 5: always

	1	2	3	4	5
1. Researchers do their own statistical analysis/ use statistical packages themselves (un-aided).					
2. Statistical support services: Statistical consultancy services.					
3. Statistical support services: Questionnaire design.					
4. Statistical support services: Statistical analyses.					
5. Statistical support services: A written statistical report on analysis results & interpretation.					
6. Statistical support services: A statistical description of analysis strategy to incorporate in the article the researcher plans to submit for publication.					
7. Statistical support services: Statistical editing of the analysis section of an article the researcher plans to submit for publication.					
8. Statistical support services: Include the statistician as co-author of an article to be submitted for publication.					
9. Stats support services: Use statistical services to submit articles to journals.					
10. Statistical support services: Use statistical services to respond to journal reviewers' feedback and resubmit articles.					
11. Statistical support services: Some or all of the options listed in 2-10.					
12. Statistical support services: Only ad hoc statistical queries.					
13. Do not use stats resources or services at all.					

9. Do you believe - as a manager with | 1. Yes | |

research interests - that a research resource centre (that supplies certain research support services) has the potential to impact research publication? Please motivate briefly	2. No **Please motivate your response:**

Section 2

The research process (*"doing research"):* Producing research findings towards article production and publication, as perceived by the a manger with research interests

1. General → 2. Research process → 3. Environments → 4. Role players → 5. Journal review

10. *Please take a few minutes to consider this question: the two questions that follow build on this question*: **The research process** Please jot down - in bulleted format - the **research steps that you as a manager with research interests perceive to be vital in producing a research article**: from inception of an idea about a research topic to article acceptance.	• • • • • • .
11. With reference to the "conception-to-acceptance" framework of the previous question, **which step/s** do you in your capacity as a manager with research interests **perceive to be the most critical** in successfully publishing an article? Please motivate your response briefly.	.
12. Which **obstacles in the research process** do you as a manager see as potentially the most critical for article production and acceptance in an accredited journal?	• • • • • • .

Section 3
The contexts/ or environments in which research – that leads to article production – is conducted

1. General → 2. Research process → **3. Environments** → 4. Role players → 5. Journal review

*In this section, please respond to the questions stated keeping in mind that researchers who do research & submit articles, function within **various environments (or contexts).** For example, the researcher's institutional environment; faculty environment; delimited research environment; and the publishing environment.*

13. The **institutional environment** of a researcher represents the organization to which the researcher has been appointed and include for example, the physical infrastructure, executive management, policies, vision and mission, appointment and remuneration conditions, job requirements, funding, management, HR staff, functionality, support, resource centres & associated staff.

In your capacity as a manager with research interests which **issues and actions in the INSTITUTIONAL ENVIRONMENT** have the potential to impact "**doing research"& the publication** of research findings, when expressing:	
(i) Your general opinion of impacting ***institutional issues or actions***	***(ii)*** *Your opinion of institutional* ***issues that differently impact novice and experienced*** *researchers*

14. The **departmental or faculty environment** of a researcher represents the department/ faculty/ discipline where the researcher is stationed: for example colleagues, mentors & faculty management with certain executive powers to: appoint, promote, grant funding, support, provide resources; mentor; tutor; research and create a faculty culture.

In your capacity as manager with research interests which issues and actions in the Departmental Environment have the potential to impact the research process & publication of research findings, when expressing,	
(i) Your general opinion of impacting faculty issues and actions	***(ii)*** *Your opinion of faculty* ***issues that differently impact novice and experienced*** *researchers*

15. The **research environment** represents the immediate surroundings that facilitate research: a researchers' subject specific knowledge, experience, skills, preferences, capabilities, available resources, research exposure, communication & interaction, networks, collaboration opportunities, mentors, research teams, IT capabilities, research mindedness

In your capacity as a manager which issues and actions in the RESEARCH ENVIRONMENT have the potential to impact the research process & publication of research findings, when expressing,	
(i) Your general opinion of impacting research environment issues or actions	***(ii) Your opinion of research environment issues that differently impact novice and experienced researchers***

16. The **editorial environment** represents the staff (editors/s, peer reviewers, admin, press) & processes that determine publishing policy & standards; administers & evaluates submissions/ re-submissions; rejects or forwards submissions for peer review; appoints & administers peer reviewers; evaluation of articles by reviewers with subject specific knowledge; corresponds; prepares journal layout & timing.

In your capacity as a manager with research interests which issues in the EDITORIAL ENVIRONMENT have the potential to impact the research process & publication of research findings, when expressing,	
(i) Your general opinion of impacting editorial environment issues or actions	***(ii) Your opinion of editorial environment issues that differently impact novice and experienced researchers***

17. In your experience which other context/s have the potential to affect the research process & publication of research findings?

Section 4
The key role players that impact successful publication of research findings

1. General → 2. Research process → 3. Environments → 4. Role players → 5. Journal review

18. Recall from memory a researcher that you as a manager with research interests perceive to be proficient in conducting and publishing his/ her research. Please list the **success competencies/characteristics** that you think empowers him/ her to publish successfully.

List of success competencies of productive researchers	
1.	
2.	
3.	
4.	
5.	

19. The literature refers to a number of **role players** that have the potential to impact the research process & successful publication of research. Who do you as a manager with research interests perceive to be influential role players? What role do they play in research?

Influential role players		What makes their role influential?
1.		
2.		
3.		
4.		
5.		

20. In your experience as a manager with research interests, to what extent do you believe that successful research & research publication are influenced by the **researcher and a research team (& other role players)** or solely by the researcher? Please motivate briefly.

Researcher/ research team dynamics *(Legend:1 = no extent, 2 = some extent; 3= great extent)*	**1**	**2**	**3**
1. Solely the effort of the researcher.			
2. The effort of the researcher & research team members.			
3. The efforts of the researcher, team members & other role players.			
4. The efforts of the researcher and other role players.			
5. Other			

Please motivate your response:

21. In which context do you perceive the **statistician to be a role player** that impacts the research process, and research publication?

Context in which a statistician contributes most towards publication of research	
1. A research team member throughout the research process.	
2. An ad-hoc service consulted as required.	
3. A technician to conduct data analysis – a number cruncher.	
4.	
5. Other	

Please motivate your response:

Section 5
The journal peer review process towards article production and publication

22. In your experience, to what extent does anonymity of the author impact the integrity of the review process of submitted articles? Please motivate your response.	**Please describe/ motivate**
23. What are the characteristics of an efficient editor?	**Please list characteristics/ competencies** • • •
24. In your experience, what characteristics/ competencies qualify peer reviewers to make a just evaluation of a submitted article?	**Please list properties** • • •
25. Apart from article content, novelty of research and neatly structured layout, to what extent & how do other factors have the potential to impact editors' and/ or peer-reviewers evaluation of an article?	**Please list and motivate briefly** • • •
26. Considering article content: what do you perceive as critical issues which cause editors/ reviewers to reject articles or recommend 'a serious re-write' prior to resubmission?	**Please jot down issues**

Thank you for your valued time and input. It is highly appreciated.

Appendix 5, Chapter 5
Appendix 5.1

Table 5.23: Integrating the crux of questions asked of interim developed theory with the formulation of questionnaire questions to address the areas of concern and advance theory development in continued cycles of analysis

Category	Questionnaire items	What in essence does the categories/ dimensions imply? This guides answering to issues listed in column 4 "These questionnaire statements focus on ……."	What was asked of developing theory?
Research process	q2.1 – q5.18		• Quantitatively verify the reliability of the research process construct in ROP • Quantitatively verify the research process as core category of ROP theory (relates to all categories) • Quantitatively determine nature of relational links to other categories • Does the research process presents as a procedural category (certain 'steps' or components?)
Plan & design	q2.1-2.13	…. the importance of researchers' insight in planning research (the reciprocal effect of type of research question, questionnaire format, appropriate analyses); and the importance of planning as such, logical reasoning, perseverance & social skills	• Quantitatively verify the reliability of the planning & design dimension-construct of the research process in ROP theory • Is the ethical review process element of the research process(a sub-dimension of the plan & design dimension of the research process)
Execute & collect	q3.1-3.8	….. the importance of researcher knowledge, experience and savvy to aptly & ethically execute research to deliver quality data & research with integrity	• Quantitatively verify the reliability of the execute & collect dimension-construct of the research process in ROP theory
Analyse & interpret	q4.3-4.9	…. on the importance of the interplay between statistical knowledge, literacy, statistical resources (software) , logic and statistical reasoning to ensure correct analyses & interpretation	• Quantitatively verify the reliability of the analyse & interpret dimension-construct of the research process in ROP theory
Write-up & submit	q5.1 - 5.10; 5.18; 6.15.5 – 6.15.6	…the importance of research-, statistical-, subject specific knowledge and savvy to integrate research write-up. Successful write-up requires specific skills, acceptance of role-responsibilities & respect for role-players	• Quantitatively verify the reliability of the write-up & submit dimension-construct of the research process in ROP theory • Should the editorial/ peer review/ publication process be included in the researcher environment?/ In the research process? • Does the peer-review process form sub-dimension of the research process (via the dimension of write-up & submit?) • Verify article submission part of research process category (via write-up & submit dimension) • Entire editorial process relevant in delimited researcher field?
Research role players	q6.15.8; 6.15.12; 6.15.18; 2.14; 5.11; 5.16	…. on the importance of the responsibility roles of researchers & other role players: responsibility to be/ become knowledgeable, gain experience; & accept specific role responsibilities, e.g. respect for other players	• Quantitatively verify the reliability of the role players construct in ROP theory • Do managers form a dimension of the role players' category? • Role player responsibility: A role player dimension or a research practice dimension? • Team members form dimension of role-player category; but 'team-approach to research' forms a property of research practice category?

Attitude towards research	q2.16; 2.18; 3.9; 3.10 - 3.12; 4.13-4.15; 5.14; 5.15	…. on a lax/ uninformed attitude re the research process (aspects of planning, execution &submission), resources/ services, role player-responsibilities (peer reviewer, statistician, researcher)	•Quantitatively verify the reliability of the attitude construct in ROP theory •Does a relational link exits between attitude & research resources? •Consider negative attitude/ perception towards research resources/ stats services noted in field notes •Relational link with skills & attributes?
Research resources	q6.13.2 6.13.4– 6.13.5 6.13.12	…. the type of statistical services – as a research resource – researchers value to do research & publish successfully	•Quantitatively verify the reliability of the resources construct in ROP theory •Are research resource centres a dimension of the research resource category? •Does research climate category relate to resources category? •Does role players-category relate to resources category?
Skills, attributes of researchers	q2.10 – 2.13; 4.7; 5.6	…. on skills & capabilities of the researcher (logical reasoning, communication, stats capabilities, language & writing) in the research process (planning & write-up) to effectively do research & publish	•Quantitatively confirm the reliability of the skills & attributes-construct in ROP theory •Is motivational-mindset an element of the skills & attribute category and motivators (e.g. promotion) an element of the research climate category
Knowledge	q6.1-q6.18		•Quantitatively verify the reliability of the knowledge construct in ROP theory •Does a relational link exists between knowledge & role players? •Does knowledge relate to skills and attributes ?
Statistical literacy	q6.13.3 6.13.6 – 6.13.10	…. aspects of statistical literacy needed in components of the research process to effectively conduct research (ability to design questionnaire, report results, interpret stats analysis, contribute & integrate stats with subject knowledge in articles; respond to reviewer critique)	•Quantitatively verify the reliability of the statistical literacy dimension- construct of knowledge in ROP theory
ubject-knowledge	q6.15.9 – 6.15.11; 4.2	…. the importance of subject knowledge; and also on the combination of subject & statistical knowledge in the research process (design-, analysis interpretation-, write-up components) to produce research findings & publish	•Quantitatively verify the reliability of the subject knowledge dimension-construct of knowledge in ROP theory
Research & publication savvy	q6.15.1 – 6.15.6; 6.15.12; 6.15;13; 6.15.16 – 6.15.18	…. on the importance of research- & publication savvy (publication trends, publication requirements of integrity, quality, ethical research); and on the importance of experience of researchers (appropriate techniques for circumstances; execution pitfalls, apt interpretation, 'know' data) to effectively do research	•Quantitatively verify the reliability of the research & publication dimension-construct of knowledge in ROP theory

Appendix 5.2

Academic researcher closed-ended questionnaire[146]

Research output productivity (article publication)

UNISA, College of Graduate Studies
School of Interdisciplinary Research and Graduate Studies.

Re: A request for your input in measuring conceptualizations of what impacts research output productivity (article publication) in accredited journals

Dear Research Participant,
Thank you for your willingness to participate. I appreciate that your time is limited. This questionnaire is designed to learn from your experience as a researcher (who has published) what you perceive to be issues that affect the publication of research articles in accredited journals. To this end, this questionnaire is structured around the stages of the research process.

The objective of the research is to develop a theoretical model of ***factors that affect research output productivity (article publication).*** The research uses a grounded theory methodology and information on research publication is therefore collected by various means: this questionnaire represents one such method. (Other means include the literature, field notes, observation and an open-ended questionnaire). This questionnaire is a follow-up data collection step and aims at refining concepts derived in earlier data collection and analysis cycles.

Interest in this field originated from experience as a consulting statistician to researching academics who aim to publish their findings. Over this period, informal observation - from a statistical perspective - seems to suggest that several factors affect research output delivery (article publication). Initial investigation in the study confirms these suspicions and suggests broad classes of influential effects. However the influence domain seems dauntingly far-reaching. The aim of this subsequent step is therefore to delimit the field of research.

Please note:

- The questions are intended to probe broad conceptualizations but also to stimulate your thoughts. Please feel free to add any experience/ perception which you feel have been overlooked.
- Participation is voluntary and absolutely anonymous. Data will be saved in encrypted format, stored for three years and thereafter deleted. Data will be solely used for research purposes and will only be accessible to the researcher of this study. You may choose to opt out at any given time or refrain from answering a specific question. However, a complete set of responses is valued and your experience will contribute greatly towards suggesting a favourable research environment for the timely delivery of research output (articles).
- Please note that completion of the questionnaire is regarded as your consent to participate.
- This research has been cleared by the CEDU Ethics Committee of UNISA and complies with the ethical principles set out in the UNISA Ethical Research Policy Document of 2011.
- I am currently enrolled for my doctoral study at UNISA with the registered research topic: **Mapping the dynamics of research output productivity: viewed from a statistical research support perspective**

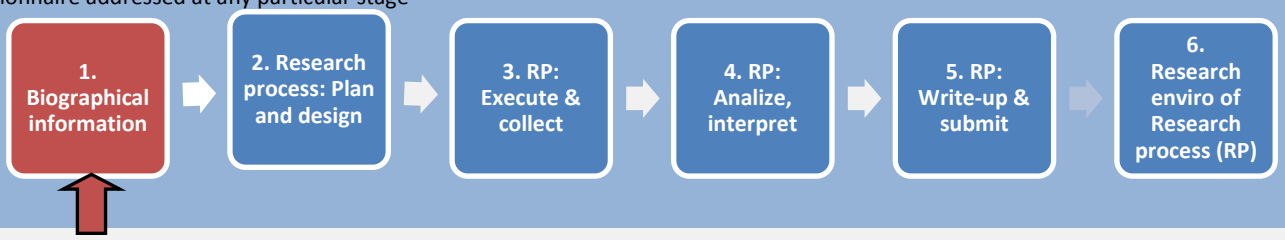
Hélène Müller (mulleh@unisa.ac.za, office: 012-4293965)
Prof Paul Prinsloo, supervisor (Research Professor, CEMS, UNISA , office: 012-4334719)

[146] A similar questionnaire was distributed to the four statistician-participants with some formulation altered to where reference to 'researcher' was changed with 'support statistician/ or practicing statistician'.

Factors that affect the publication of academic articles in accredited journals

Section 1: Biographical information and layout of the questionnaire

The questionnaire investigates factors that impact article publication within the framework of the research process (RP) and a statistical research support perspective. **Section 1** queries biographical properties of respondents & introduces the research environment & research process (RP) that underlie article production. **Sections 2-6** evaluate the effect of broad conceptual issues for their impact on article development & publication against four stages of the research process (RP). Although not specifically indicated, eight broad conceptual issues are evaluated in each phase of the research process (RP) namely, research literacy; statistical literacy; publication savvy; subject knowledge; researcher skills/ characteristics; role responsibilities; experience & attitude. (The odd coloured block indicates the section of the questionnaire addressed at any particular stage



1. Please select all the options that best apply to you in your current position within your College:

i. Lecturer	
ii. Senior lecturer	
iii. Associate professor	
iv. Full professor	
v. Member of a task team/ committee	
vi. Department chair/ management	
vii. College CEO/ management	
viii. Other	
If "other" please indicate:	

2. Please indicate the year in which you were appointed in your first academic position that required you to do research

3. Please indicate the year in which your first article (in either an accredited or non-accredited journal) was published

4. Did you acquire any other research experience prior to your appointment as academic (e.g. quality control in industry; science councils)?

i. Yes	
ii. No	
iii. Not applicable	

5. How would you rate your writing proficiency as author?

1. Good to excellent	
2. Average	
3. Not that good	
4. Prefer not to answer	

6. Do you predominantly publish in your mother tongue?

1. Yes	
2. No	

7. **Referring back to your publication history (question 3),**

4a. Have you experienced more and less productive publishing phases in your career?	**yes**	**no**
4b. If you answered YES to question 4a, which factors do you perceive hinder or slow your rate of article publication? (Tick as many options as you find applicable). If you answered NO to question 4a please continue to the next question, question 5		
i. Personal circumstances		
ii. Managerial/ Administrative work load		
iii. Academic work load		
iv. Institutional factors/ or policy		
v. Lack of research focus		
vi. Issues related to "Doing the actual research": the research process		
vii. Research support: a research resource centre		
viii. Researcher attributes & properties		
ix. Co-researchers and research role players		
x. The editorial and peer-review process		
xi. **Please indicate any other reasons that your personally feel affect publication productivity (articles)**		

8. **If you had a free choice, how would you describe your personal research/ community engagement/ teaching preferences? (select only ONE option)**

i. A preference for research	
ii. A preference for teaching	
iii. A preference for community engagement projects	
iv. A preference for a combination of research and community involvement	
v. A preference for a combination of research and teaching	
vi. A preference for a combination of community involvement and teaching	
vii. A preference for a combination of research, teaching and community involvement	
viii. None of the mentioned preferences or combination of these preferences	

9. **As a researcher, do you prefer to publish solo (no co-authors)?**

1. Yes	
2. No	
3. It depends on the specific research project	

10. **Which research design-type do you feel most comfortable with in your research?**

i.	Quantitative research design	
ii.	Qualitative research design	
iii.	Mixed methods research design	
iv.	Other	
If "other" please indicate type of research:		

11. What do you experience the average time-lag to be between the actual commencement of a research study for publication purposes and the publication of the research results?
---------- years ór, ---------- months

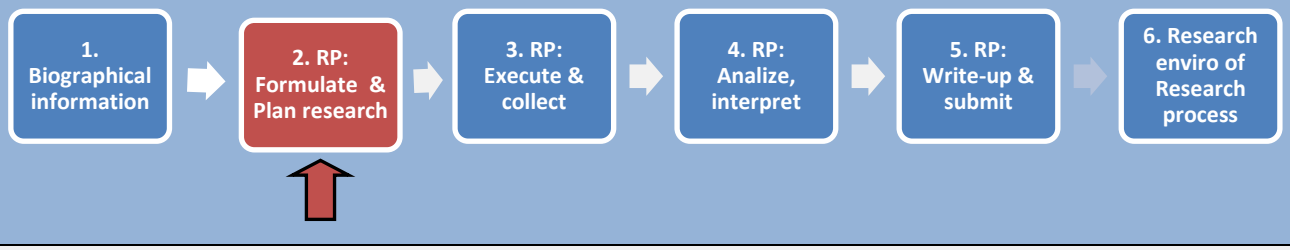
12. What do you believe motivates you, as a researcher, to publish? (you may select more than one option)

i. Research advancement	
ii. Career advancement within your current Department	
iii. Career advancement within the greater academic environment	
iv. Acknowledgement as researcher/ an expert	
v. Personal satisfaction	
vi. Other	
vii. Why did you choose this/ these option/s?	

Factors that affect article publication

Section 2: The Research Process (RP): The formulation & planning step of research

The formulation and planning phase of research revolves around the identification of knowledge gaps in the research field; the subsequent formulation of a research problem & objective; the formulation of research questions (or hypotheses); and the planning of research execution



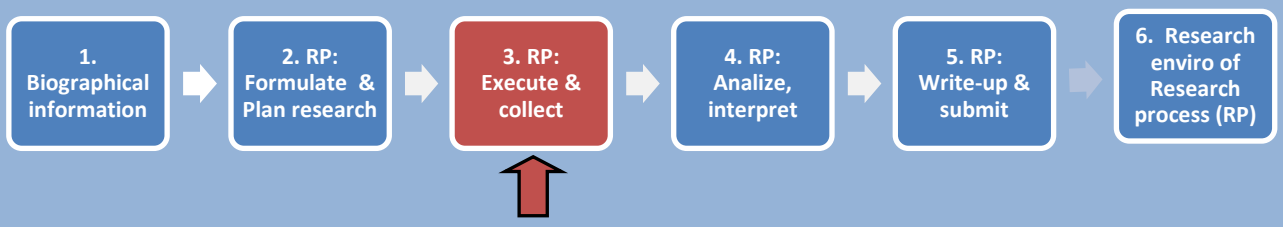
In the planning and formulation phase of research, to what extent do you perceive that the following issues impact on the successful publication of research findings? **Please rate your perceptions according to the rating legend**: 1 = of no relevance; 2 = not really important; 3 = important; 4 = really important; 5 = of critical importance/ extremely relevant	1	2	3	4	5	
1. The type of research questions formulated impacts the planned procedural steps of research execution						
2. The outcome of the quality of research - and how publishable it will be - hinges on sensible planning						
3. Research collaboration in a variety of research projects is an excellent way of developing 'research savvy'						
4. In quantitative/ mixed methods research specific statistical principles underlie research execution						
5. Statistical principles should be kept in mind when planning research (e.g. appropriate sampling technique)						
6. An important planning consideration in all research is the dependency between the type of research question (e.g. relational, predictive, explanatory) & the appropriate analysis technique						
7. The suitability of a particular measuring instrument/s (e.g. interviews, questionnaires) for a study is dependent on the type of research questions formulated in the study						
8. A well planned questionnaire will effectively evaluate the research question/s of the study						
9. The type of questionnaire-questions included in a questionnaire (e.g. Likert rating scale; multiple-choice questions) determines the options of valid analysis techniques						
10. The ability to think logically forms an important component of the research						

planning phase (e.g. collected data type/ analysis technique compliance)						
11. Good social skills of a researcher strengthen planning deliberations with research role players						
12. In research, communication skills are crucial when the rationale for planned research actions are discussed & debated within the research team context						
13. Perseverance is an important quality in moving research forward from the planning phase to successful reporting of the findings of executed research						
14. The team-role of the statistician in research planning (if involved in the research) demands of him/ her to be a good listener						
Please rate the following questions according to the included attitude legend: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree)						
15. Research is 'difficult' to plan because of the various underlying methodological assumptions that have to be considered						
16. When a research team is involved in research planning, the "whole" team carries the responsibility for the reliability/ trustworthiness of the research						
17. Statisticians are prone to over-emphasize statistical principles during research planning						
18. The planning phase of qualitative research is exempt from statistical considerations						

Factors that affect article publication

Section 3: The Research Process: the execution and data collection step of research

The research execution & data collection phase of research involves the execution of planned research activities (actual sampling, pilot study, observation, questionnaire- and / or interview administration) and the electronic capturing of participant responses

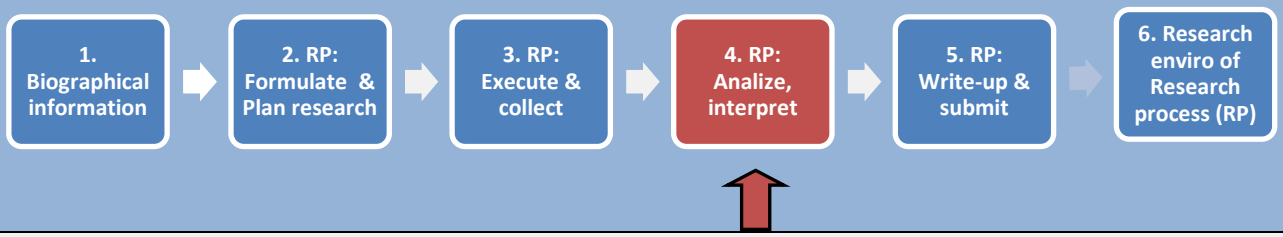


During research execution and data collection, to what extent do you perceive that the following issues impact on the successful publication of research findings?					
Please rate your perceptions according to the rating legend: 1 = of no relevance; 2 = not really important; 3 = important; 4 = really important; 5 = of critical importance/ extremely relevant	**1**	**2**	**3**	**4**	**5**
1. It is good research practice to 'pilot test' a measuring instrument before the finalized instrument is administered to all research participants					
2. Research integrity, which impacts eventual research publication, is compromised if fieldworkers ignore guidelines when they conduct interviews (e.g. leading interview questions, etc.)					
3. The trustworthiness of analyses & research findings depend on the quality of collected data					
4. The coordination of research activities during research implementation is crucial to the success of a research project					
5. The accurate capturing of participant responses ensures a reliable data base for analysis purposes					
6. The statistician regards data base verification as an integral part of research execution					
7. A researcher needs good communication skills to coordinate the execution of research activities with a research team (if applicable)					
8. During research implementation the responsibility for proper research execution ultimately resides with the researcher					
Please rate the following questions according to the attitude legend: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree)					
9. Some researchers skip pilot testing because they do not value the contribution that pilot study feedback have/ could have on refining the final measuring instrument (for main study application)					
10. Research execution need not follow every detail of the original research plan					
11. The fact that research flexibility (deviation from the original research plan during research execution) has limits has to be appreciated in research					
12. Qualitative research implementation is exempt from statistical considerations					

Factors that affect article publication

Section 4: The Research Process: the analysis & results interpretation step of research

The data analysis & interpretation phase of the research process involves the application of the analysis strategy (analysis techniques) & the interpretation of analysis results.

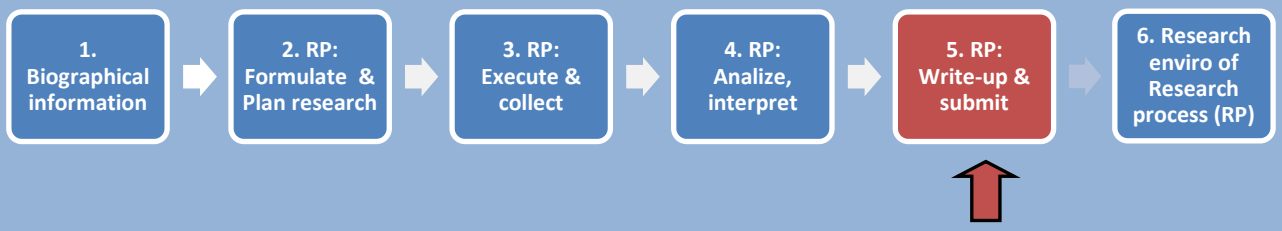


During the data analysis & interpretation phase of research, to what extent do you perceive that the following issues impact on the successful publication of research findings? **Please rate your perceptions according to the rating legend**: 1 = of no relevance; 2 = not really important; 3 = important; 4 = really important; 5 = of critical importance/ extremely relevant	**1**	**2**	**3**	**4**	**5**
1. New information in data (e.g. trends relationships, perceptions) can only be discovered if appropriate analysis techniques are used					
2. The statistical analysis of quantitative data is a specialized field that requires specialised expertise					
3. The correct application and interpretation of textual-analysis software packages require specific skills of researchers					
4. A sound statistical background enables a researcher to interpret his/ her quantitative analysis results reliably without the assistance of statistical support services					
5. The value of thorough research planning becomes evident when a well-planned analysis strategy leads to sensible, reliable results					
6. The correct interpretation of analysis results is directly dependent on a clear understanding of the underlying analysis technique/s					
7. Knowledge of the assumptions that underlie certain analysis techniques (e.g. regression) ensures that assumptions are not violated and results compromised					
8. Current statistical packages have a used friendly interface, however the interpretation of analysis results still require a certain level of statistical literacy					
9. Researchers who are numerically inclined are not intimidated by the output-format of statistical analysis results					
10. Mathematical proficiency enables researchers to interpret the gist of quantitative/ mixed methods analysis results more readily					
Please rate the following questions according to the attitude legend: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree)					
11. It is justified for a researcher - who is not statistically inclined - to entrust the "number crunching" to the statistician without compromising research integrity and ethics					
12. Data analysis may require statistical support (from a statistician), but an attitude of joint responsibility for the interpretation of analysis results should be assumed by researcher and statistician					
13. Easy access to user-friendly "tinned statistical packages" renders the statistician's role obsolete					
14. The subject knowledge of the researcher places him/her in the sole position to interpret analysis findings in terms of the context of the subject specific research field					
15. In mixed methods and quantitative research, the statistician should assume responsibility for the validity of findings reported in articles					
16. A written report should form part of a statistician's data-analysis responsibilities					

Factors that affect article publication

Section 5: The write-up and article submission phase of the research process

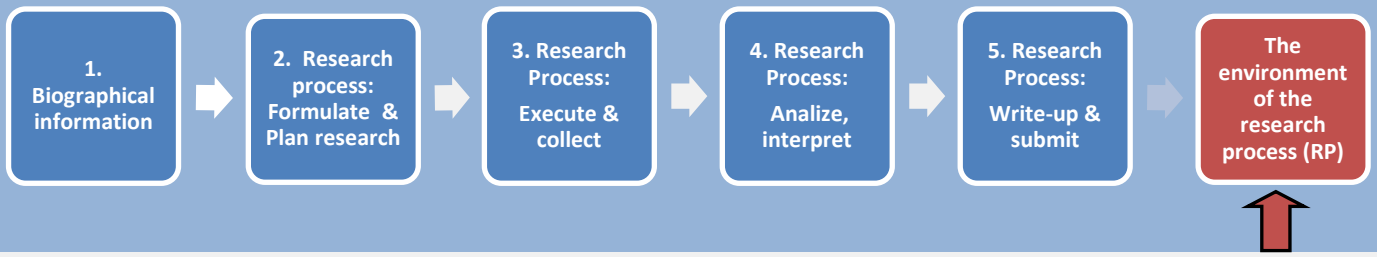
The write-up & article-submission phase of research includes all activities related to the production of a written manuscript for submission; article submission; evaluation and resubmission (or withdrawal) up to eventual publication (or rejection) of the article



During article write-up and submission, to what extent do you perceive the following issues impact on the successful publication of research findings? **Please rate your perceptions according to the rating legend**: 1 = of no relevance; 2 = not really important; 3 = important; 4 = really important; 5 = of critical importance/ extremely relevant	**1**	**2**	**3**	**4**	**5**
1. A well-documented analysis strategy (designed during the planning phase of research) eases the write-up of the analysis-description section of an article					
2. An annotated, cleverly presented table of statistical results in a submitted quantitative/ mixed methods article is worth more than a lengthy statistical description					
3. A too elaborate discussion of statistical results in an article can overshadow the main objective of research, namely new knowledge development in a specific research field					
4. A statistician's ability to communicate analysis results to researchers in easily understandable terms is key to accurate reporting					
5. Writing skills is a crucial component of a successful research article					
6. The English proficiency of English second-language speakers may impact the successful publication of articles					
7. The successful transfer of knowledge (in articles) is dependent on the quality of language use					
8. Within a research team context, the responsibility for accurately reporting research findings in articles (mixed/ or quantitative designs) is the joint responsibility of researcher and consulting statistician					
9. It is good research practice to acknowledge the contribution of research team members either by means of article co-authorship or specific acknowledgement in submitted articles					
10. Article submission and re-submission-responsibilities reside with the researcher: in so doing the researcher maintains article "ownership" (e.g. intimate knowledge of article content)					
11. Journal reviewers should only review articles that fall within their field of expertise					
Please rate the following questions according to the attitude legend: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree)					
12. Authors sometimes perceive that submitted articles are sent back to attend to minor, personal preference issues of reviewers					
13. When resubmitting an article, authors may perceive that by complying with comments made by reviewers can compromise the accuracy of research findings: authors may therefore be justified in maintaining their original position					
14. Authors should attend to all reviewer suggestions (even if they disagree) rather than risk the chance of not publishing an article					
15. In-depth consideration of issues raised by peer reviewers need not be undertaken during article resubmission: superficial adjustments will suffice					
19. The contribution of the statistician should be acknowledged as co-author if his/ her					

contribution was central to the submission						
20. The final responsibility for the integrity and quality of an article rests with those who are acknowledged as co-authors						
16. Statisticians who contribute to article write-up and analyses should be included as co-authors						

Factors that affect article publication (type 1 relation)
Section 6: The researcher environment



12. Please indicate the type and extent of statistical resources and services that you use/ or would like to use when you do research

Extent legend: **1**: not at all; 2: perhaps; 3: 50/50 (do use but able to cope solo); 4: to a great extent; 5: always	**1**	**2**	**3**	**4**	**5**	
14. You do your own statistical analysis/ use statistical packages yourself – (un-aided)						
15. Statistical support services: Statistical consultancy services for the entire project						
16. Statistical support services: Questionnaire design						
17. Statistical support services: Statistical analyses						
18. Statistical support services: Written statistical report, analysis results & interpretation						
19. Statistical support services: A statistical description of the analysis strategy to incorporate in an article you plan to submit for publication						
20. Statistical support services: Statistical editing of the analysis section of an article you plan to be submit for publication						
21. Statistical support services: Use a statistician as co-author of articles to be submitted for publication						
22. Statistical support services: Use statistical services to submit articles to journals						
23. Statistical support services: Use statistical services to respond to journal reviewers' feedback and resubmit articles						
24. Statistical support services: Only ad hoc statistical queries						
25. The extent to which you use statistical services depends on the nature of the research project						

13. Do you believe that a research resource centre (that supplies research support services, e.g. statistical support) has the potential to favourably impact the publication of research articles? (you may choose more than one option)

1. Yes, in my own research endeavours this will be the case	
2. No, I personally manage all aspects of my own research	
3. The type of project determines need for technical/ statistical support	
4. Certain research fields will benefit more than other fields	
5. Unsure – it will depend on a number of factors such as, for example, the qualifications of the resource centre staff, their competencies, experience and how the centre is managed	
6. Not at all	

14. The dynamics of factors that have the potential to impact the general research process:

Please rate – according to your perception – the extent to which the listed aspects (subject knowledge, experience & publication savvy) impact on the research process and thus on the eventual publication of research articles

Rating legend: 1 = of no relevance; 2 = not really important; 3 = important; 4 = really important; 5 = extremely relevant	1	2	3	4	5
1. The demand for quantitative or mixed methods article submissions is steadily increasing					
2. Journals increasingly require proof of ethical clearance of research					
3. A research team is morally bound to conduct research in an ethical manner					
4. Submitted articles should illustrate research integrity (e.g. validity, reliability, trustworthiness					
5. Reporting the analysis results should be done in easily understandable fashion					
6. An appropriate journal for article submission should be considered during article write-up					
7. The successful publication of an article depends on the "fit" of the article with the aims, scope and style of the journal					
8. The researcher who is knowledgeable in his subject field will recognize critical knowledge gaps in the field					
9. Questionnaire design should be based on theoretical constructs in the subject specific field					
10. Sensible interpretation of analysis results requires a solid subject-specific knowledge base					
11. Subject specific knowledge & statistical insight ensure that analysis results are contextually linked to the research field					
12. An experienced researcher knows that the correct timing of research actions, for example, interviews in mixed methods research, can be crucial in validating preliminary findings					
13. Research experience sensitizes researchers to the fact that specific analysis techniques address specific types of research questions					
14. Experienced researchers are aware of the ripple effect of conscientious planning on effective research execution					
15. Being part of a research team can expose researchers to good research practice					
16. Research experience creates awareness of research-execution pitfalls that may compromise research integrity (e.g. insufficient sample size)					
17. The ability to sensibly interpret statistical analysis develops with experience					
18. Experienced researchers are quick to notice/detect interesting trends in their data					

Please feel free to express any additional comments on article publication:

Thank you for your participation

Appendix 5.3

E-mail to request questionnaire completion and reminder e-mail to research participants

From: Muller, Helene
Sent: 20 June 2014 4:07 PM
To: .....
Subject: FW: A kind request to complete a questionnaire: UNISA, Helene Muller

June 2014
College of Graduate studies
UNISA

Dear Prof … , or Mr … , or Ms…..
A kind request to complete the attached questionnaire: Research output productivity (Article publication)

Questionnaire completion will be greatly appreciated and your response will contribute towards a deeper understanding of an issue which I, as the researcher describe as,

> "*A statistical perspective on factors that affect research output productivity, with specific reference to article publication*"

The topic and investigation forms part of my doctoral studies.

The study follows a Classic Grounded Theory research approach and aims to develop theory on the dynamics of research output productivity. More specifically factors or events that impact the publication of academic articles. Up to this point in the investigation, data has been sampled from various other data sources (this is quite typical of the Grounded Theory approach) which allowed the study to tentatively conceptualise theoretical concepts that have the potential to impact article publication. The questionnaire attached is based on the findings of the analyses of these previously sampled data sources and aim to verify and refine theory with newly collected data. Therefore, your response will assist in clarifying areas of uncertainty and enrich other aspects of theory that have emerged in earlier stages of analysis and sampling. Data collected from the attached questionnaire will furthermore assist in establishing and identifying relationships between the various theoretical constructs. This will serve developing theory to explain the dynamics of producing research output (effectively) as published articles.

You have been approached to complete the questionnaire because of your extensive research and publication experience. Your experience implies that you are comfortable with the research process that underpins "doing research" and publishing articles. Your experience of research, the research process and the publication process will contribute immensely to a deeper understanding of the dynamic process of article publication.

Your participation will be highly appreciated. You may complete the questionnaire manually or electronically, whichever you find easiest. I will collect the questionnaire from you, or you can e-mail me your completed questionnaire. Thank you once again for your willingness to assist me in this investigation.

Kind regards
Helene

Helene Muller
Research Support Consultant (statistics)
College of Graduate Studies
School of Interdisciplinary Research & Graduate Studies
TvW 4-01
012-4293965, mulleh@unisa.ac.za
www.unisa.ac.za/cgs

Reminder e-mail:
From: Muller, Helene
Sent: 21 August 2014 8:14 AM
To: .....
Subject: FW: A kind reminder to complete a questionnaire: UNISA, Helene Muller

August 2014
College of Graduate studies
UNISA

Dear Prof … or Mr … or Ms…..
A kind reminder to complete the attached questionnaire: Research output productivity (Article publication)

In July a questionnaire on research *output productivity (article publication*) was mailed to you with the request to participate in the study. The title of the study was indicated as,

> "*A statistical perspective on factors that affect research output productivity, with specific reference to article publication*"

The previous e-mail requested your participation because of the fact that you are considered an experienced researcher who have published research articles. Your insight will be valuable in understanding the phenomenon of producing research and publishing articles.

I appreciate that your time is limited. A response will however still be greatly appreciated and enrich our understanding of the dynamics of producing research and publishing the findings in an academic journal. If you are willing to participate please complete the attached questionnaire either electronically or by hand. (It can be arranged to collect a manually completed questionnaire from your office)

I thank you
Helene Muller (Doctoral student. Supervisor, Prof Paul Prinsloo, Research professor, CEMS, UNISA),

School of Interdisciplinary Research & Graduate Studies
TvW 4-01
012-4293965, mulleh@unisa.ac.za
www.unisa.ac.za/cgs

University of South Africa
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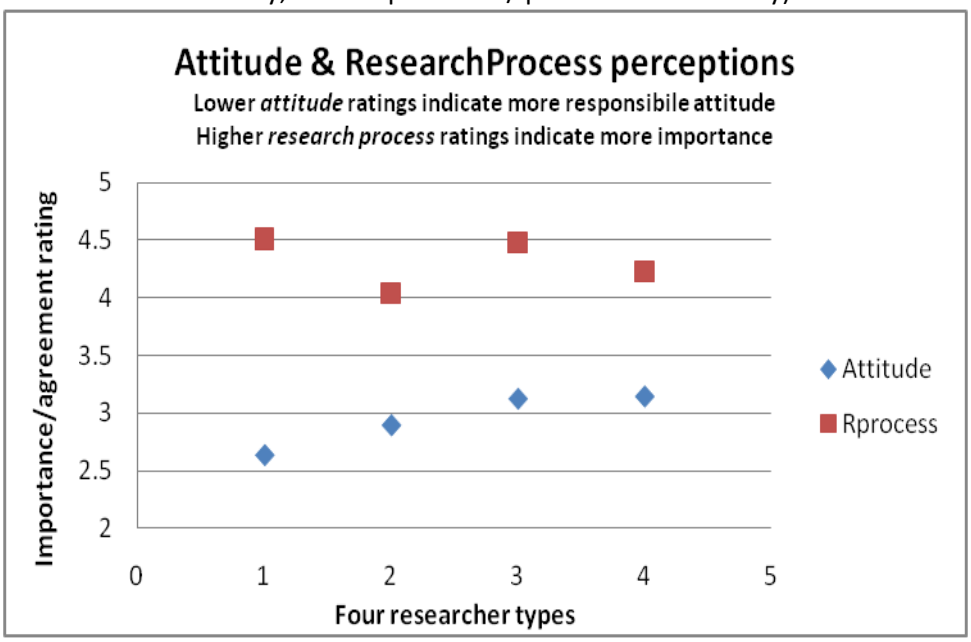
PO Box 392, UNISA, 0003, South Africa
www.unisa.ac.za

UNISA university of south africa

Appendix 5.4

Figure 5.3: Scatter plot indicating how perceptions of attitude and the research process discriminate between the four researcher-types

('1': expert/ publish effectively; '2':experienced/ publish effectively; '2': experienced/ publish with difficulty; '4': inexperienced/ publish with difficulty)



Appendix 6, Chapter 6
Appendix 6.1

Protocol requesting statistical support

UNISA university of south africa

College of Graduate studies
School of Interdisciplinary research
Statistical support unit

Request for statistical support/ consultation

Kindly supply the following information(tick the appropriate box, unless more info is required)

1.

Date:

College (where post grad degree is registered/ research is undertaken)

1. CGS		2. CHS	
3. CEDU		4. CEMS	
5. CAES		6. CL	
7. CSET		8. Other	

School/Department:_____

2.

Supervisor

Surname	Name/ title	tel no (work)	e-mail-address

3.

Co-supervisor

Surname	Name/ title	tel no (work)	e-mail-address

4.

Student (if applicable)

Surname	Name/ title	tel no (work)	e-mail-address

5.

Purpose of support request

Masters	Doctoral	Publication/ article	Conference Proceedings	other

6.

Title of thesis/ article

7.	Research approach (not qualitative) Quantitative research design | Mixed method research design | Other | |
8.	Please list the research question/s and sub questions of the study (Please also attach separately the research proposal or background info for the study if the research is undertaken towards a masters or doctoral qualification Research questions and sub-research questions 1. 2 3 4 5
9.	Service/s required 1. Consultation to clarify issues of the research (ad hoc) 2. Questionnaire design based on research questions 3. Statistical analysis of data 4. Feedback on results 5. Review of sections of results chapters (chapter 4 or 5) 6. Input in articles 7. Other, please specify
10.	What outcomes do you expect of the research participation? Please list 1. 2. 3. 4.
11.	Signature of supervisor and date

PROTOCOL

1. Support is provided to M and D students conducting quantitative/ mixed methods research – not qualitative research. Support is always provided in co-operation with the supervisor.
2. Support provided to academics conducting research towards own post grad studies or research towards article publication/ paper presentation.
3. Stats support/ consultation is provided on an appointment basis.
4. Stats support is regarded as a teamwork effort between supervisor, student and statistician, therefore the supervisor needs to be informed on stats consultations at all times. To ensure such a work environment it is strongly suggested that,
    - the supervisor initiates the stats support request
    - the supervisor sits in on at least the initial consultation with a student since the stats unit regards stats support as support rendered to the supervisor in the first instance, since the supervisor carries the responsibility for the successful supervision of the student
    - The statistician informs/advises the supervisor of intended research question formulations, questionnaire design action, analysis strategy, analysis results and interpretation and feedback on stats findings. In this way, the supervisor remains informed on all aspects of the qualitative development of the study. Since the responsibility for the accurate reporting of statistical findings ultimately reverts to the supervisor.
5. If substantial statistical contributions to articles (or theses) are made by the statistician the onus rests on the researcher/ supervisor to include the statistician as co-author/ co-supervisor of the research or give recognition to the CGS in this regard
6. Prepared to abide with the queuing system that the unit follows – because of a shortage of statisticians.

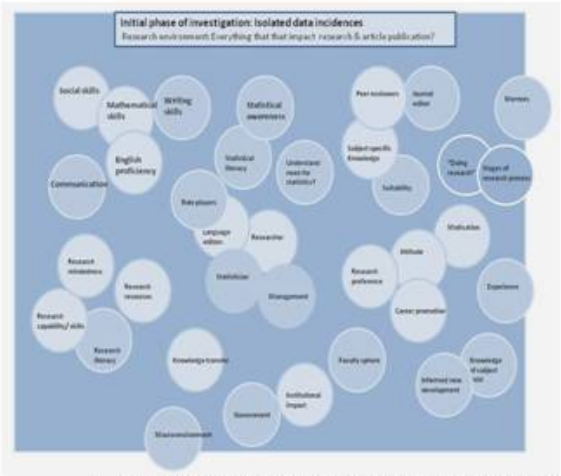
I, _____ agree to inform the statistician when the publication, degree or conference proceedings has been submitted; if/when it has been accepted as well as the if/when it has been published/presented

(student / or supervisor)

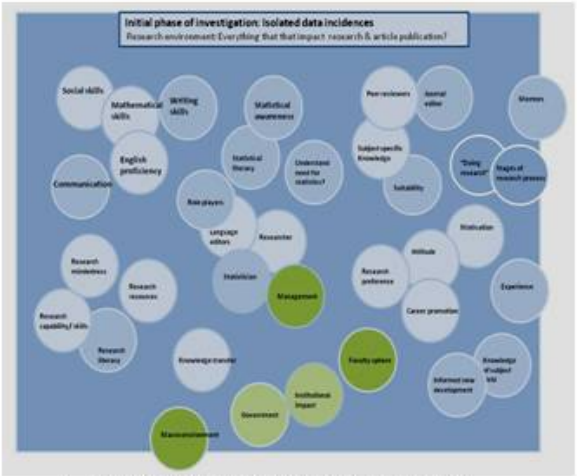
Appendix 6.2

Figure A: A visual reminder of theory development of ROP (Chapter 4 and 5)

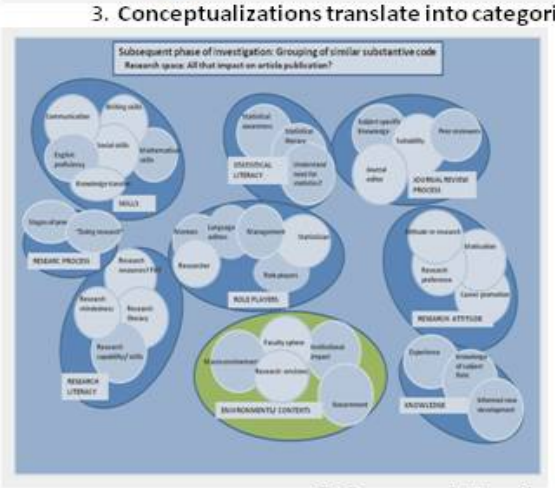
1. Data events



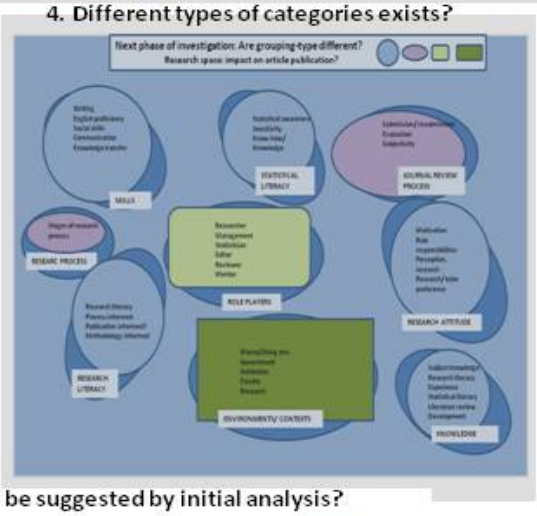
2. Subsets of data events suggest concepts



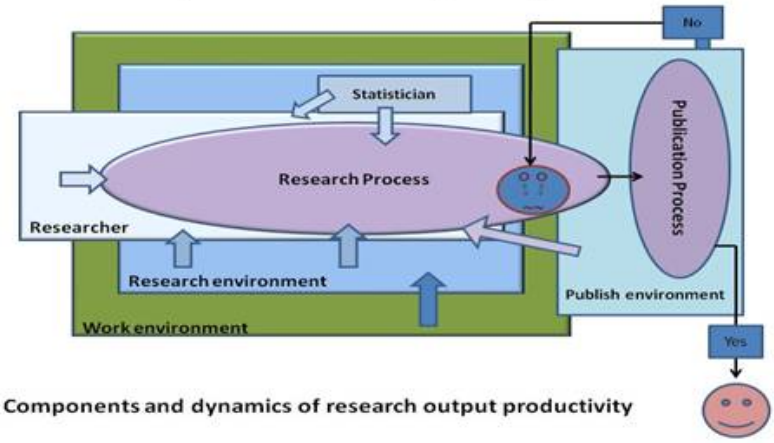
3. Conceptualizations translate into categories



4. Different types of categories exists?



5. Can a provisional model be suggested by initial analysis?



Components and dynamics of research output productivity

Figure B: A visual reminder of the effect of vantage-point or position of respondents on perceptions of ROP (Chapter 4)