An Investigation into Productivity of Manufacturing SMEs in the Gauteng Region

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DECLARATION

I, the undersigned, declare that this dissertation is my own unaided work. It is submitted for the degree of **Masters in Business Leadership** at SBL in the University of South Africa. It has not been submitted before for any other degree or examination in any other university.

Signature..... 

February 2014.

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AN INVESTIGATION OF PRODUCTIVITY IN MANUFACTURING INDUSTRIES AMONGST SMEs IN SOUTH AFRICA

PURPOSE

This study investigates productivity of the manufacturing SMEs in the Gauteng Region.

PROBLEM STATEMENT

Government, Labour and businesses have mandated Productivity SA, as an institution, to enable manufacturing industries to improve in their productivity and in turn to grow their country's economy, but still low productivity is currently a serious epidemic facing manufacturing industries amongst the SMEs in South Africa, where SMEs are operating below minimum efficiency scale leading to lower productivity levels. Labour productivity and capital productivity are currently becoming an economic problem and sector problem whereby in terms of labour productivity. What needs to be addressed is that how efficiency influences the productivity of the manufacturing SMEs in the Gauteng Region?"

RESEARCH OBJECTIVES

The primary objective is to investigate the productivity of in the manufacturing SMEs and to develop some guidelines on how efficiency can improve the productivity of manufacturing SMEs in the Gauteng Region.

SIGNIFICANCE OF THE STUDY

Based on the background of the literature review, studies focusing on efficiency as a measure were undertaken amongst large manufacturing industries worldwide as well in South Africa in improving productivity in their businesses. Furthermore, literature was studied and debated abroad on efficiency as a measure amongst SMEs in improving productivity in their businesses. Findings of these studies were found to be positive. The main contributor to the positive findings of the research was the improvement of productivity in the manufacturing businesses. It is therefore suggested that one way of improving productivity amongst SMEs is to develop a framework on efficiency in the improvement of productivity amongst manufacturing SMEs. Even though, there is sufficient literature on productivity amongst manufacturing industries, there is little

supporting literature on the productivity measurement of manufacturing industries amongst SMEs. The purpose of this study is to address the issue of the relationship between efficiency and its influence to the productivity of manufacturing SMEs amongst the Gauteng Region.

Hypotheses

Different hypotheses were provided on efficiency and its influence on the productivity of manufacturing SMEs.

LITERATURE

The literature investigated theories based on the influence of productivity in manufacturing SMEs. This literature included brief theoretical background of manufacturing; a brief theoretical background on how productivity influences improvement; a brief theoretical background on how productivity is measured; factors influencing productivity of the manufacturing industries and manufacturing SMEs; a theoretical background of inefficiency; inefficiency in manufacturing industries and manufacturing SMEs; a theoretical background on efficiency; efficiency in the manufacturing industries; and how efficiency improves the productivity of manufacturing SMEs.

RESEARCH METHODOLOGY

Research design

The research was exploratory, descriptive and quantitative in nature, which highlighted research problems of low productivity amongst the manufacturing SMEs. The research methodology employed was aimed at obtaining the most recent, relevant and concise information about productivity into the manufacturing SMEs in the West of Industria around the Gauteng region. The research used experimental design, which consisted of productivity measures and factors influencing productivity of manufacturing SMEs. The study will be causal in nature. The following rating scales were used in the research questionnaire, such as five point scale. Nominal and ordinal as measurement scales were included in the research questionnaire for measuring respondents amongst manufacturing SMEs. Thus, the study used quantitative research methods to evaluate the experiences faced by manufacturing SMEs owners in terms how efficiency could influence the

productivity of manufacturing SMEs owners in the South of Industria around the Gauteng Region.

Population

There are nine provinces in South Africa, but the study utilised questionnaires to gather data from the manufacturing SMEs only in the South of Industria around the Gauteng Region.

Sampling

Since research questions addresses objectives that require the research to make statistical inferences about the characteristics of the population, a probability sample was be used to ensure that each member of the population amongst manufacturing SMEs is given a non-zero chance of selection.

Measurement instrument

Primary data was collected through the use of a questionnaire. A five-point-scale questionnaire was developed and distributed to manufacturing SME owners including managers. The questionnaire was utilised and was simple and using concise language, easy layout and clear instructions. Secondary data was also collected by means of various literature sources concerning manufacturing SMEs. During the follow up process, telephone interviews were used when communicating with respondents amongst manufacturing SMEs.

Reliability and validity of the study

Based on the reliability of the study, the researcher will firstly investigate whether the study has sufficient control to ensure that the conclusion drawn is truly warranted by the data. Secondly, the researcher will establish whether observations made during the study can also be applied to areas outside of Gauteng region, including internationally.

Data analysis

Statistical Package for the Social Sciences (SPSS) was used as computer software in order to describe and analyse sets of quantitative data. Data was edited and captured for processing. Descriptive measures were provided to describe data according to its structure. Data was be summarised for individual variables in the form of frequency tables. Cronbach's alpha was used to measure the construct and alpha coefficient was also applied describe the reliability of factors extracted from dichotomous and/or multi-point formatted questionnaires or scales

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CHAPTER 1: INTRODUCTION

1.1 Introduction

The study examines an investigation of productivity in manufacturing industries amongst Small and Medium Enterprises (SMEs) in the Gauteng region. Chapter 1 sketches the background of the study; problem statement.

1.2 Background of the study

Low productivity is currently a serious epidemic facing manufacturing industries amongst SMEs in South Africa where SMEs are operating below minimum efficiency scale, leading to lower productivity levels, (International Labour Organisation, 2012:11). When an industry, be it manufacturing or service sector, is producing below minimum efficiency or less than can possibly be attained, it is considered to be inefficient (St Aubyn, Pina, Garcia & Pais, 2009:5).

Labour and capital productivity are currently becoming economic and sector problems, (Sarwar, Ishaqe, Ehsan, Pirzada, and Nasir, 2012:173; International Labour Organisation, 2012:6). In terms of labour productivity, the work force is affected by poor work performance and skills shortage (Nel, 2010:10; Sarwar, Ishaqe, Ehsan, Pirzada & Nasir, 2012:173; International Labour Organisation, 2012:6).

On the other hand, with capital productivity, manufacturing SMEs are faced with three problem areas of capital. These are human capital, financial capital and physical capital. Firstly, these manufacturing industries face a financial dilemma where finance is not available or easily accessible. (Sala-I-Martin, Bilbao-osorio, Blanke, Crotti, Hanouz, Geiger & Ko, 2013:37-41). Secondly, there is shortage of knowledge, skills and experience, necessary to improve the quality of human capital (Federke & Bogetić, 2009:1528-529; Rhee & Pyo, 2010:122; Banda & Verdugo, 2011:293; International Labour Organisation, 2012:2). Furthermore, in terms of physical capital, poor physical

infrastructure is another problem facing SMEs in manufacturing industries. (Case, Fair & Oster, 2009:766).

Gross domestic product (GDP) as indicated by Gordhan (2013:6) reached 2.5 percent in 2012 and was expected to grow at 2.7 percent in 2013, rising to 3.8 percent in 2015. However, higher growth is required in other sectors, particularly manufacturing industries, to improve productivity. Chetty, Greyling, Schoeman van Zyl and Wentzel (2010:213) note that GDP involves the value of final goods and services produced within the borders of a country during one year. For example, the real GDP for manufacturing industries decreased from 3.6 percent in 2011 to 2.4 percent in 2012. Since productivity growth is considered to be the key to improving GDP per capita and hence living standards, if productivity decreases, this becomes an economic problem and GDP suffers (Quarterly Bulletin, 2013:5).

The real challenge is to encourage, in particular, the use of efficiency as a measure for manufacturing SMEs to create their own work opportunities. Sookdeo (2009:39) also emphasizes that it is impossible to improve productivity, or even to control existing productivity, unless one measures what one hopes to control and improve. Studies focusing on efficiency as a measure were undertaken amongst large manufacturing industries in improving productivity in their businesses (Sarwar, Ishaqe, Ehsan & Pirzada, 2012:174). The findings of these studies were positive. The main contributor to the positive findings of the research was the improvement of productivity in manufacturing businesses. It is therefore suggested, that one way of improving productivity amongst SMEs is to develop a framework of efficiency in the improvement of productivity amongst manufacturing SMEs. Although there is sufficient literature on productivity amongst manufacturing industries using efficiency in the improvement of productivity, (Higon, Bozkurt, Clegg, Grugulis, Salis, Vasilakos & Williams, 2009:205), there is little supporting literature on the use of efficiency in improving productivity of manufacturing SMEs. (Sarwar, Ishaqe, Ehsan and Pirzada, 2012:174). Kunene (2008:123) for example, states that when training is provided to employees as part of their package, skills acquired are reflected in their personal work activities rather than in increased productivity of manufacturing SMEs.

Furthermore, studies have also been done abroad on how efficiency positively contributed to the productivity of SMEs (Terzioski, 2010:895; Bunse, Vodicka, Schönsleben, Brülhart &

Ernst, 2011:668-74; Roudaut & Vanhems, 2012:155; Alexopoulos, Kounetas & Tzelepis, 2012:8; Oeij, De Looze, Have, Van Rhijn & Kuijt-Evers, 2012:94).

Thus, the purpose of this study is to address the need for efficiency as a measure so that operational performance manufacturing SMEs can improve productivity in their businesses. Furthermore, the research will explain how the efficiency of the operational performance of SMEs will be measured. Based on the introduction under study, the section provides a background of the study. It explains the problem statement followed by the research objectives of the study. Secondly, the literature of the study is presented to review the contributions of each source used with the supporting hypothesis followed by the importance of the study. The paper concludes by laying down the research methodology and design of the study as well as giving an outline of the research report and its work plan.

1.3 Problem statement

Government, labour and businesses have mandated Productivity SA, as an institution, to enable manufacturing industries to improve their productivity and in turn grow their country's economy (Nel, Coka, Vermeulen, Sicwebu, Mbongwe, Moodley, Morotoba, Nyalunga, Mosia, Mashamba, Mdima, Brink, Mosai, Maupye & Janse van Rensburg, 2011:3-4; Ratshivhanda, Coka, Madikizela, Khumalo, Govindor, Tyamzashe & Mashamba, 2012:1-6). Nieman and Pretorius (2004:30), refers to growth as "the changes that take place in the process, culture and attitudes when a business grows, moving from being small to larger."

Even though government, labour and businesses have mandated Productivity SA to enable manufacturing industries to improve in their productivity and in turn to grow their country's economy, (as it is indicated earlier in the primary source), manufacturing industries are currently experiencing low productivity (Nel, et al., 2011:3; International Labour Organisation, 2012:6). Labour and capital productivity are becoming economic and sector problems (International Labour Organisation, 2012:6). Manufacturing SMEs are operating below minimum efficiency leading to lower productivity levels (International Labour Organisation, 2012:11).

According to Nel, Coka, Vermeulen, Sicwebu, Mbongwe, Moodley, Morotoba, Nyalunga, Mosia, Mashamba, Mdima, Brink, Mosai, Maupye, and Janse van Rensburg, (2011:3), productivity positively influences operational processes of industries. These in turn are the main tools in boosting the country's economy. So, if productivity is low amongst manufacturing industries, these industries do not perform well in their operational processes. Poor operational processes amongst manufacturing industries result in poor standards of living within the country. As defined by Krajewski, Ritzman and Malhotra (2010:24), an operation is "a group of resources performing all or part of one or more processes." Whereas a process is a series of tasks performed in order to do, make or achieve something, (Crowther, Kavanagh & Ashby, 2010:922). What needs to be addressed, which is not known is that how efficiency influences the productivity of the manufacturing SMEs in the Gauteng Region?"

1.4 Research question

The question addressed in this study is therefore: how efficiency influences the productivity of manufacturing SMEs in the Gauteng region? In light of the research question above, the following research questions are addressed:

- Do manufacturing SMEs measure productivity in their businesses in the Gauteng region?
- What are the factors influencing productivity of manufacturing SMEs in the Gauteng region?
- Do manufacturing SMEs adopt efficiency in improving the productivity of their businesses in the Gauteng region?
- What are the possible benefits that manufacturing SMEs could generate towards efficiency in their businesses in the Gauteng region?

1.5 Research objectives

1.5.1 Primary objectives

The primary objective is to investigate productivity of manufacturing SMEs and create an awareness of the need of efficiency to improve the productivity of manufacturing SMEs in the Gauteng region.

1.5.2 Secondary objectives

The objective of the study is, using the literature, to investigate and explore:

- A brief theoretical background of manufacturing;
- A brief theoretical background on how productivity is improved;
- A brief theoretical background on how productivity is measured;
- Factors influencing productivity of manufacturing industries and SMEs;
- A theoretical background on inefficiency;
- Inefficiency in manufacturing industries and SMEs;
- A theoretical background on efficiency;
- Efficiency in manufacturing industries, and
- A theoretical background on how efficiency improves the productivity of manufacturing SMEs.

1.6 Research hypotheses

- Productivity of manufacturing SMEs will decrease if manufacturing SMEs are operating below efficiency.
- Efficiency in manufacturing businesses will improve productivity of manufacturing SMEs.

1.7 Significance of the study

Even though there is sufficient literature on how efficiency improves the productivity amongst large manufacturing industries worldwide as well as manufacturing SMEs internationally, (Higon, Bozkurt, Clegg, Grugulis, Salis, Vasilakos & Williams, 2009:205; there is little supporting literature on how efficiency improves the productivity of manufacturing SMEs in the Gauteng region (Sarwar, Ishaqe, Ehsan and Pirzada, 2012:174). Studies done abroad on how efficiency positively contributed to the productivity of SMEs were also found to be positive (Terzioski, 2010:895; Bunse, Vodicka, Schönsleben, Brülhart & Ernst, 2011:668-74; Roudaut & Vanhems, 2012:155; Alexopoulos, Kounetas & Tzelepis, 2012:8; Oeij, De Looze, Have, Van Rhijn & Kuijt-Evers, 2012:94). The importance of the study is that this paper will address the issue of the relationship between efficiency, productivity and its influence on manufacturing SMEs. The study will then add to the body of knowledge. Industries will have an awareness of the need for efficiency amongst SMEs to improve productivity in their businesses.

1.8 Definition of key concepts

The key concepts used in this study are briefly defined below.

1.8.1 What is a SME?

The definition of SME varies from country to country. South Africa is not the same as Europe. For example, Stockes and Wilson (2010:4) consider small businesses based on qualitative factors as having three essential characteristics, namely:

- A firm is managed by its owners in a personalized manner;
- Small businesses occupy a relatively small share of the market in economic terms, and
- A small business is independent in the sense that it does not form part of a larger enterprise and its ownership is relatively free from outside control in its principal decisions.

The quantitative definition in Europe is provided below:

EU SME Definition				
Enterprise category	**Headcount**	**Turnover**	**or**	**Balance sheet total**
Medium-sized	<250	≤ € 50 million		≤ € 43 million
Small	<50	≤ € 10 million		≤ € 10 million
Micro	<10	≤ € 2 million		≤ € 2 million
Sources: Stockes and Wilson (2010: 4)				

For the purpose of the study, research will focus on the definition of National Small Business Act 26 of 2003 (Republic of South Africa, 2003), which refers to "a separate and distinct business entity, including cooperative enterprises and non-governmental organisations, managed by one owner or more which, including its branches or subsidiaries, if any, is predominantly carried on in any sector or sub-sector of the economy and which can be classified as a small and a medium enterprise (SME).

Whereas with quantitative classification, the following table defines SMEs in terms of three main criteria, namely: employment, turnover and asset value:

Sector or sub-sectors in accordance with the standard industrial classification	Size or class	Total full-time equivalent of paid employees Less than	Total annual turnover Less than	Total gross asset value (fixed property excl) Less than
Agriculture	Medium Small Very small Micro	100 50 10 5	R 4.00m R 2.00m R 0.40m R 0.15m	R 4.00m R 2.00m R 0.40m R 0.10m
Mining & quarrying	Medium Small Very small Micro	200 50 20 5	R30.00m R7.50m R3.00m R0.15m	R18.00m R4.50m R1.80m R0.10m
Manufacturing	Medium Small Very small Micro	200 50 20 5	R40.00m R10.00m R 4.00m R 0.15m	R15.00m R 3.75m R 1.50m R 0.10m
Electricity, gas & Water	Medium Small Very small Micro	200 50 20 5	R40.00m R10.00m R 4.00m R 0.15m	R15.00m R 3.75m R 1.50m R 0.10m
Construction	Medium Small Very small Micro	200 50 20 5	R20.00m R 5.00m R 2.00m R 0.15m	R 4.00m R 1.00m R 0.40m R 0.10m
Retail and motor trade and repair services	Medium Small Very small Micro	100 50 10 5	R30.00m R15.00m R 3.00m R 0.15m	R 5.00m R 2.50m R 0.50m R 0.10m
Wholesale trade, commercial agents & allied services	Medium Small Very small Micro	100 50 10 5	R50.00m R25.00m R 5.00m R 0.15m	R 8.00m R 4.00m R 0.50m R 0.10m
Catering, accommodation & other trade	Medium Small Very small Micro	100 50 10 5	R10.00m R 5.00m R 1.00m R 0.15m	R 2.00m R 1.00m R 0.20m R 0.10m
Transport, storage & communications	Medium Small Very small Micro	100 50 10 5	R20.00m R10.00m R 2.00m R 0.15m	R 5.00m R 2.50m R 0.50m R 0.10m
Finance & business services	Medium Small Very small Micro	100 50 10 5	R20.00m R10.00m R 2.00m R 0.15m	R 4.00m R 2.00m R 0.40m R 0.10m

Community, social & personal services	Medium	100	R10.00m	R 5.00m
	Small	50	R 5.00m	R 2.50m
	Very small	10	R 1.00m	R 0.50m
	Micro	5	R 0.15m	R 0.10m

(National Small Business Act 26 of 2003, Republic of South Africa: 2003),

1.8.2 What is productivity?

According to Vaidya and Hudnurkar (2013:297); Tuttle & Chen (2012:565), productivity embraces both effectiveness and efficiency. Findings from Tuttle and Chen (2012:565), consider effectiveness as "the extent to which the organisation produces the right outputs or in the broader societal context, it effectively addresses the right social problem." To the contrary, efficiency means "the level of resources required to create each unit of output" (Tuttle & Chen, 2012:565).

The research focuses on various concepts of how productivity is defined. Stevenson (2009:53) defines productivity as "the measure of the effective use of resources usually expressed as the ratio of output to input." According to Pycraft, Singh, Phihlela, Slack, Chambers and Johnson (2007:48); Slack, Chambers and Johnson (2010:50), productivity is "the ratio of what is produced by an operation to what is required to produce it". Pycraft, et al. (2007:48) & Slack, et al. (2010:50) further subdivide productivity into two sub concepts such as single factor productivity and multi-factor productivity. Single factor productivity includes the effects of input costs if the single input factor is expressed in cost terms, such as 'labour costs'. Whereas multi-factor productivity, which is also total factor productivity, is the measure that includes all input factors. Krajewski, Ritzman and Malhotra (2010:39) refer to productivity as "the value of outputs (services and products) produced divided by the values of input resources (wages, cost of equipment, and so on) used." As is defined by Heizer and Render (2011:45), productivity is "the ratio of output (goods and services) divided by the inputs (resource, such as labour and capital)." Almström and Kinnander (2011:759) refer to productivity as "output over input, which is correctly-produced products that fulfil their specifications over the value of all resources spent for producing these products during a specific time period." In the same token, Oeij, De Looze, Have, Van Rhijn and Kuijt-Evers (2012:94) describe productivity as "the ratio between outputs and inputs where the input comprises all factors utilised to produce the output demand." It is evident by these explanations of productivity that most definitions of productivity centre on outputs and inputs. The next chapter to be discussed is the literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The aim of the literature review is to investigate the influence of productivity in manufacturing SMEs. This literature includes a brief theoretical background of manufacturing; a brief theoretical background on how productivity affects improvement; a brief theoretical background on how productivity is measured; factors influencing productivity of manufacturing industries and manufacturing SMEs; a theoretical background of inefficiency, inefficiency in manufacturing industries and manufacturing SMEs; a theoretical background on efficiency; efficiency in manufacturing industries; and how efficiency improve the productivity of manufacturing SMEs.

2.2 A brief theoretical background of manufacturing

A brief theoretical background of manufacturing is addressed below. Singer and Donoso (2007:526-31), for example, say that manufacturing focuses on the use of natural resources, technology and machinery to make the transformation process a success. As is explained by Zhang and Gregory (2011:744), the transformation process, also referred to as the operational processes, is defined as "the process that shows the flow of material and information through employees to create valuable outputs of finished goods and services to customers."

According to Krüger and Steenkamp (2008:8) manufacturing, which is referred to as production, is "the transformation of resources comprising labour, materials, energy and capital (inputs) into goods and services (outputs) of prescribed quality which are delivered on time." Heizer and Render (2011:36) consider production, which was previously known as manufacturing, as "the creation of goods and services." As is indicated by Slack, Chambers, and Johnston, (2010:5) it is the responsibility of the production manager - now referred to as an operations manager - to use resources effectively. These include labour, materials, energy and capital to produce products and/or render services in manufacturing industries. According to Heizer and Render (2011:36), operations management is "the set of activities that create value in the form of goods and services by transforming inputs into outputs."

According to Grütter (2010:2), there are various ways in which operations can be managed and this can be done from a systems point of view. A system is referred to as "a collection of parts that work together to function as a whole." Furthermore, characteristics of systems are addressed in different ways. Systems have inputs that make up the system and inputs that are processed by a system; consisting of dynamically linked, interdependent elements; and transforming inputs into outputs through performing certain activities on some of the inputs.

Based on the system, the input-transformation-output model is addressed. Inputs mainly involve labour, capital, material and energy used in the manufacturing process (Anyaeche & Oluleye, 2009:52). The transformation process focuses on arrangement of activities during which the products being produced, or the service being delivered, is changed through the combination of labour, capital material and energy (Grütter, 2010:6; Zhang & Gregory, 2011:744). Outputs are considered to be completed products, called products and services (Anyaeche & Oluleye, 2009:47)

Grütter (2010:26) identifies various types of operation/manufacturing processes used through the transformation process by manufacturing industries to produce products and provide services as projects, job shops, batch production, assembly lines and continuous processes.

Scott-Young and Samson (2009:613-14) say that projects can require the building of necessary plant and equipment infrastructure to create or improve production capacity in response to increased market demand. For example, these projects consist of project teams that are made up of technical specialists from different functional areas and consulting organisations with the purpose of carrying out complex, specialised tasks within a limited time frame. The second production (manufacturing) process is job shops which focus on a workshop where small numbers of a product are produced on an irregular basis. This type of process is appropriate when the product is manufactured according to the specifications of the client and is also referred to as a once-off job, carried out on a small scale (Grütter, 2010:29).

De Snoo, Van Wezel and Wortmann (2011:1352) identify the third production process, the batch production process, as production orders that have different routings. Orders are

produced batch for batch. All these batches are dependent on available capacity. The fourth type of process is assembly line whereby a sequence of tasks is arranged in stages and components are assembled into a product (Grütter, 2010:32). Lastly, continuous process involves highly inflexible operations that produce a flow of standardised products (Grütter, 2010:35). The next area of operations management to be discussed is productivity improvement.

Thus, in view of the above statement, the aim of the input-transformation-output is to ensure how resources are used to produce products and render services (Singer & Donoso, 2007:528; Anyaeche & Oluleye, 2009:47; Zhang and Gregory (2011:744). Furthermore it appears that manufacturing industries operate in a system using their respective types of production or manufacturing process such as projects; job shops; batch production; assembly lines and continuous processes to make their production or manufacturing process a success (Scott-Young & Samson, 2009:613-14 ;Grütter, 2010:29; De Snoo, Van Wezel & Wortmann (2011:1352).

2.3 Productivity improvement

A brief theoretical background of productivity improvement is also studied and addressed below. Productivity improvement is the optimum combination and maximum utilisation of all the production powers (factors) present in the organisation. Economically inevitable costs remain in the organisation with the purpose of maximising the profitability of the organisation in the long term (Sookdeo, 2009:17). As is explained by Heizer and Render (2011:45-48), improved productivity means improved efficiency. Furthermore, improved productivity (also regarded as increase in productivity) depends on labour, capital, and management. Productivity improvement from the contribution of labour results from education background and a healthy environment in manufacturing industries.

As indicated earlier, in findings from the literature, the study indicated three areas of capital contributing to productivity improvement; human capital (which is mainly labour), financial capital and physical capital (Sala-I-Martin, Bilbao-osorio, Blanke, Crotti, Hanouz, Geiger & Ko, 2013:37-41; Federke & Bogetić, 2009:1528-29; Rhee & Pyo, 2010:122; Banda & Verdugo, 2011:293; International Labour Organisation, 2012:2; Case, Fair & Oster,(2009:766). Heizer & Render (2011:39) refer to management as "entailing planning, organising, staffing, leading and controlling." Finally, improved (increase in) productivity in

the contribution of management is to ensure that labour and capital are effectively used. This improvement includes use of knowledge and application of technology (Heizer & Render, 2011:49).

Sookdeo (2009:30) advises that productivity improves when there are more efficient manufacturing methods; simpler product design and specifications, modern material, more exact processes, improved factory layout, larger markets, more efficient productivity standards and better management. Nin-Pratt, Yu and Shenggen (2010:213) comments that productivity is increased when increase in output outpaces (exceeds) increase in input.

Sookdeo (2009:16) considers outputs to be all goods and services which satisfy human needs. Furthermore, including not only industrial products but also those for agriculture and other services sectors such as retail businesses, doctoral surgery, educational institutions, office administration and other tertiary industries. These are expressed in physical units, money or hours. On the contrary, Singer and Donoso (2007:526-31), for example, say that manufacturing industries use inputs such as natural resources, technology and machinery.

Almström and Kinnander (2011:760) state that productivity can be improved by increasing output or decreasing input. Findings from the literature indicate that three basic factors can be used to achieve productivity improvement at the activity level. These factors include the method (M), the performance (P) and the utilisation (U), which are formulated as Productivity equals to MxPxU. The method factor is the ideal method performed at normal speed and without any disturbances and is expressed as a productivity measure on an activity level, which is for example, products produced per time unit. Whereas, with the performance factor, the focus is on the speed factor which is the extent at which work is performed, be it manual or machine work. That is, working faster or slower than normal. Finally, the utilisation factor determines how a large part of the available working time is spent on the intended method. Typical losses that result in less than 100 percent utilisation are for example, breakdowns, set ups, waiting times in terms of the operator or machines, and personal time for workers. In this case, when improving utilisation, the target is 100 percent including personal time and some relief for workers (breaks) (Almström & Kinnander, 2011:760).

As is emphasised by Heizer and Render (2011:45), the more efficient manufacturing industries make changes by transforming resources into products and services. The more these industries improve in productivity, in turn, the more value is added to the products and services provided by these industries. Oeij, De Looze, Have, Van Rhijn and Kuijt-Evers (2012:98) state that improved productivity may happen in numerous ways. These include output increase at constant input; input decrease at constant output; output increase and input decrease; output and input increase, with the increase in input proportionally less; and input and output decrease with the decrease in output proportionally less.

It appears on the literature that productivity improvement can be attained through improved efficiency within the operations of manufacturing industries (Sookdeo, 2009:17; Heizer & Render, 2011:45-48; Sala-I-Martin, Bilbao-osorio, Blanke, Crotti, Hanouz, Geiger & Ko, 2013:37-41; Federke & Bogetić, 2009:1528-29; Rhee & Pyo, 2010:122; Banda & Verdugo, 2011:293; International Labour Organisation, 2012:2; Case, Fair & Oster, 2009:766; Nin-Pratt, Yu & Shenggen, 2010:213; Almström & Kinnander, 2011:760) personal time and some relief for workers (breaks) (Almström & Kinnander, 2011:760; Oeij, De Looze, Have, Van Rhijn & Kuijt-Evers, 2012:98).

2.4 Productivity measurement

Productivity measurement is studied and addressed below. As is pointed out by Heizer & Render (2011:47), productivity measurement helps manufacturing industries in determining how well they are doing. Based on the findings from the literature, productivity measurement is the measurement of units produced divided by units used. This results in single factor productivity or multifactor productivity also known as total resource productivity (Heizer & Render, 2011:47). According to Almström and Kinnander (2011:760) there are different types of productivity measures in terms of inputs and outputs and there is no one best way to measure this. These inputs and outputs vary between different products, production system and business in manufacturing. Furthermore, productivity measures are divided into partial and total productivity. Partial measures concern the connection between a single production factor and the production result. The example of the partial productivity measure is labour productivity. Findings from the literature indicate that total productivity, which is seldom used, is considered to be different kinds of inputs and outputs converted into monetary units (Almström and

Kinnander, 2011:760). Oeij, De Looze, Have, Van Rhijn and Kuijt-Evers (2012:94) consider productivity to be measured at the national level, in terms of volume of labour used in relation to the output produced in terms of gross domestic product.

Based on the findings from the literature review with regard to the investigation into productivity measurement amongst manufacturing industries, it appears that productivity measurement focusses on how productivity is measured, in terms of how output is produced in relation to inputs in the manufacturing process amongst manufacturing industries (Heizer & Render, 2011:47; Almström and Kinnander, 2011:760; Oeij, De Looze, Have, Van Rhijn and Kuijt-Evers, 2012:94).

2.5 How manufacturing industries and manufacturing SMEs measure productivity

Studies on how manufacturing industries and manufacturing SMEs measure productivity are addressed below. These productivity measures include labour, capital and management.

2.5.1 Manufacturing industries

2.5.1.1 Measuring labour of manufacturing industries

The literature relevant to measuring labour of manufacturing industries is studied and discussed below. According to Quintana, Leung and Chen (2008:309-11) manufacturing industries measure human capabilities where a worker could be exposed to an ergonomically sound working environment. These capabilities include skills required to use technology; ability to work manually; ability to work as a back-up system for machines; and the ability to adapt and learn existing knowledge to new situations. Käpylä, Jääskeläinen & Lönnqvist (2009:612) further comment that employees are measured through reward and use of better working methods (job design) which are considered to be positively contributing to the productivity of manufacturing industries. Battisti and Iona (2009:736) advise that "Just-in-time" (JIT) practice by both management and employees plays an important role in the production or operation process for improving the productivity of manufacturing industries. Findings from the literature indicate for example, that the use of rank improvements on the scale 1-5, ensures the quality of this type of management practice.

Jääskäleinen and Laihonen (2012:357) examine the relationship between individual knowledge worker, ability to provide value to the customer and productivity of the manufacturing industry. The aim of the literature is to measure human capital through the individual worker's knowledge to ensure productivity improvement amongst manufacturing industries. Based on the results in the literature, the individual workers' knowledge is considered to be having a positive impact on the productivity of manufacturing industries.

Total quality measurement (TQM) is used to measure human capital in terms of cost, reliability, quality, innovation, efficiency, and business effectiveness. The process of TQM is to ensure that waste and rework is minimised which in turn result in the productivity improvement of manufacturing. (Korankye, 2013:1294).

Korankye (2013:1295) refers to TQM as "a management philosophy embracing all activities through the needs of the customers and the community, and the objectives of the organisation are satisfied in the most efficient and cost effective way by maximising the potential of all employees in a continuing drive for improvement."

In terms of labour, manufacturing industries measure employees' skills, the environment for safety where employees are carrying out the job as well as research and development (R&D) (Jagoda, Lonseth & Lonseth, 2013:387).

It appears from the literature that labour is measured using skills (Quintana, Leung & Chen, 2008:309-11; Jagoda, Lonseth & Lonseth, 2013:387); abilities (Quintana, Leung & Chen, 2008:309-11; Jääskäleinen & Laihonen, 2012:357): rewards and better working methods (Käpylä, Jääskeläinen & Lönnqvist, 2009:612); Just-in-time practice (Battisti & Iona (2009:736); knowledge (Jääskeläinen & Lönnqvist, 2009:612); total quality measurement (TQM) (Korankye, 2013:1294); working environment and research and development (Jagoda, Lonseth & Lonseth, 2013:387) in the manufacturing process amongst manufacturing industries.

2.5.1.2 Measuring capital in manufacturing industries

Measurement of capital is studied and addressed below. There are various types of capital such as human capital, physical capital, financial capital, social capital and technological capital which are used in measuring productivity of manufacturing industries. This study only focuses on physical capital and financial capital.

1) Measuring physical capital in manufacturing industries

In terms of physical capital as is explained by Beaudreau (2009:11); Band and Verdugo (2011:298), the manufacturing industry uses energy through machines and equipment to measure physical capital with the aim of transforming material into products and services. The aim of the transformation processes through the use of energy to produce products and services is determined by the relationship between physical capital, such as machinery, and the productivity of manufacturing industries. Energy differs from country to country and from industry to industry. However, findings from the literature in the United Nations Industrial Development Organisation (UNIDO) indicate that energy involves fuel, electricity, heat and others energy sources such as feed stock. (UNIDO, 2010:1-11)

Käpylä, Jääskeläinen and Lönnqvist (2010:609) explain that manufacturing industries measure physical capital through use of time on operational processes to influence the productivity of manufacturing industries. Heizer & Render (2011:294) define an operation process as involving the organisation's approach to transforming resources into goods and services.

Vaidya and Hudnurkar (2012:312) report that scheduling is used to measure physical capital in terms of the flow of resources through an operation system. Scheduling means the time or date at which activities are to be undertaken. A lean operations system is used to measure physical capital in terms of quality for raw material (stock); maintenance (regular check of equipment/machinery) and the working environment with a key challenge to increase and maintain productivity in manufacturing industries. The use of lean operation enables manufacturing industries, through managers, to reduce and recycle waste while increasing output to reduce cost. However, findings from the literature indicate that productivity in manufacturing industries is positively correlated with quality of material, maintenance and a favourable working environment (Jagoda, Lonseth & Lonseth, 2013:387). Zhou (2012:2) defines lean as "the identification and elimination of non-value added processes or waste as viewed by the customer."

2) Measuring financial capital of manufacturing industries

On the contrary, with financial capital, as is reported by Alexopoulos, Kounetas, and Tzelepis (2011:7), manufacturing industries use financial statements to measure the financial conditions of these industries. However, the impact of financial conditions

determines the productivity of manufacturing industries. Jagoda, Lonseth & Lonseth (2013:387-89) point out that manufacturing industries use research and development (R&D) to measure financial capital in terms of investing as a key challenge to increase and maintain productivity. Based on the literature, productivity of manufacturing industries is found to be positively and strongly correlated with investment in R&D. Manufacturing industries use expenditure to measure energy in terms of power and fuel to determine how much money has been spent (Mandal & Madheswaran, 2011:72).

A presumption has been made to the literature that physical capital is measured in the manufacturing process using energy. (Beaudreau, 2009:11); UNIDO, 2010:1-11; Banda & Verdugo, 2011:298, explains that manufacturing industries measure physical capital through use of time (Käpylä, Jääskeläinen & Lönnqvist, 2009:609); scheduling; lean operations; maintenance (Vaidya & Hudnurkar, 2012:312); quality of material; maintenance and a favourable working environment (Jagoda, Lonseth & Lonseth, 2013:387). In terms of financial capital, it appears to the literature that manufacturing industries measure financial statements (Alexopoulos, Kounetas & Tzelepis, 2011:7; Mandal & Madheswaran, 2011:72) and investments (Jagoda, Lonseth & Lonseth, 2013:387-89) for their manufacturing processes in their businesses.

2.5.1.3 Measuring management in manufacturing industries

Measuring management in manufacturing industries has been studied and discussed from different literature and is addressed below. For instance, Chavez, Giminez, Fynes, Wiengarten and Yu (2012:581) assert that manufacturing industries measure management through internal lean practices. These practices include Just-in-time and process set-up time reduction which is the source of reducing waste through the simplification of production processes. As explained by Chen and Tan (2012:1202), findings from the literature further indicate that management in manufacturing industries can be measured through training of employees and Just-in-time through continuous improvement of production processes. Powell (2012:1503) states that not only lean practices, but also Enterprise Resource Planning (ERP) systems can be used to measure management in manufacturing industries in order to improve manufacturing processes.

According to Shi and Yu (2012:1300-10), manufacturing industries can measure management through supply chain management (SCM). If supply chain is properly managed, there will be improvement in the operational processes of manufacturing

industries and in turn, its whole value will be greater than the sum of its parts. Shi and Yu further refer to SCM as "the planning and management of all activities involved in sourcing and procurement, conversion and collaboration with channel partners, who can be suppliers, intermediaries, third party service providers, and customers."

As it is pointed out by Nand, Singh and Power (2012:889), management is measured through capabilities such as cost, quality, flexibility and delivery in improving the operational processes of manufacturing industries. Cost capability involves how manufacturing industries consider the cost of producing and providing its products or services to its customers. This capability is measured as the unit cost of product/services provided. The second capability, quality, is considered to be the extent to which the products/services provided meet the expectations of customers. This capability is measured in terms of customer satisfaction levels. Thirdly, delivery capability refers to the industry's ability to meet the promised provision of products or services within a timely manner. This capability is measured in terms of deviation from expected delivery time. Lastly, flexibility capability focuses on the industry's capacity to meet the contingent requirements of customers. This capability is usually measured as a composite of requisite variety with sufficient volume (Nand, Singh & Power, 2012:889).

Kauppi, Ronchi and Raaij (2013:846) say that manufacturing industries measure management through knowledge and skills. Therefore, with knowledge and skills, management contributes to the operational processes of manufacturing industries.

Based on the literature discussed, manufacturing industries use management to measure internal lean practices (Chavez, Giminez, Fynes, Wiengarten & Yu, 2012:581) employee training; Just-in-time and planning (Chen and Tan, 2012:1202); supply chain management (Shi & Yu, 2012:1300-10) capabilities such as cost, quality, flexibility and delivery (Nand, Singh & Power, 2012:889); and knowledge skills (Kauppi, Ronchi & Raaij, 2013:846) in the manufacturing processes of their businesses.

2.5.2 Manufacturing SMEs

2.5.2.1 Measuring labour of manufacturing SMEs

Tambunan (2008:155) says that manufacturing SMEs measure labour through the skills and knowledge in the manufacturing process of their businesses. Robson, Haugh and Obeng (2009:346-47) state that manufacturing SMEs are measured through age,

educational background, skills and business experience in the operations of their businesses.

With an age-productivity relationship, the physical strength and possibilities to compensate employee deficits in skills differ from one manufacturing business to another. In terms of some of the manufacturing businesses, be they large or small, the SME's owner or manager does not motivate employees through the use of financial support measures such as old age-reduced working time. However, this age-productivity relationship in terms of ageing, results in productivity decline. (Göbel & Zwick, 2012:35-44).

Cravo, Gourlay and Becker (2012:218) explain that manufacturing SMEs focus on the average number of years of schooling by employees in measuring human capital for the manufacturing process. Findings from Khavul, Prater and Swafford (2012:1152) indicate that education, skills and experience are used to measure labour in manufacturing SMEs.

It appears on the literature that manufacturing SMEs measure labour using skills and knowledge (Tambunan, 2008:155; Robson, Haugh & Obeng, 2009:346-47); age (Robson, Haugh & Obeng, 2009:346-47); educational background (Robson, Haugh & Obeng, 2009:346-47; Cravo, Gourlay & Becker, 2012:218) Khavul, Prater & Swafford, 2012:1152) and business experience (Haugh & Obeng, 2009:346-47; Khavul, Prater &d Swafford, (2012:1152) for the manufacturing processes in their businesses.

2.5.2.2 Measuring capital in manufacturing SMEs

Measuring of capital in manufacturing SMEs is studied and addressed below. There are various types of capital such as human, physical, financial, social and technological capital which are used in measuring productivity of manufacturing SMEs. However, the study in this case focusses only on physical and financial capital.

1) Measuring physical capital of manufacturing SMEs

Krishnamurthy and Yauch (2007:588-89) measure physical capital by using lean production for inventory on both work in process and finished goods. However, lean production contributes to implementation amongst manufacturing SMEs.

According to Robson, Haugh and Obeng (2009:346-47), physical capital in manufacturing SMEs is measured through the use of time on manufacturing processes and products

manufactured. Prusa (2010:355) reports that manufacturing SMEs use time on tangible assets such as stock generated or prepared for delivery, to measure physical capital in their businesses. Rhee and Pyo (2010:112-13) report that physical capital is measured using time on the utilisation of machinery and equipment for the number of sales produced in relation to the cost of goods sold amongst manufacturing SMEs.

Jeffers (2010:263) emphasises that physical capital is critical in using lean production to measure inventory. Findings from the literature indicate that lean production is used to measure inventory to make the manufacturing process more efficient by eliminating waste amongst manufacturing SMEs.

According to Bahri, St-Pierre and Sakka (2011:608) physical capital is measured through time on the utilisation of equipment and machines as well as production management systems amongst manufacturing SMEs. As it is reported by Khavul, Prater and Swafford (2012:1155), manufacturing SMEs use physical capital to measure time to ensure effectiveness of supply chain in the manufacturing process within their business as well as when reaching the customer in terms of delivery. This type of time is referred to as Just-in-time technique.

Manufacturing SMEs use the physical capital to measure innovation on the stock generated per employee in their businesses (Legros & Galia, 2012:172). According to Choi and Kim (2012:529) manufacturing SMEs measure physical capital by using Six Sigma to improve quality of the manufacturing process by eliminating costs and defects. According to Martinez and Silveria (2013:129), physical capital is used to measure the energy of machine and equipment to streamline the manufacturing process in manufacturing SMEs.

As is reported by Oeij, De Looze, Have, Van Rhijn, Kuijt-Evers (2012:103), manufacturing SMEs use physical capital to measure value of sales generated against measure of costs of the resources used such as material, machine and equipment.

2) Measuring financial capital of manufacturing SMEs

As is indicated by Tambunan (2008:155), manufacturing SMEs look at the expenditure income earned from the business to measure financial capital. As is pointed out by Robson, Haugh and Obeng (2009:346-47) manufacturing SMEs use record keeping

measurements to establish financial capital in their businesses. Bahri, St-Pierre and Sakka (2011:604) explain that manufacturing SMEs use information from the income statement and balance sheet such as revenues, cost of goods sold, research and development (R&D) costs, selling and administrative expense, inventories, accounts receivable, accounts payable, capital assets, debt and equity to measure financial capital of their businesses.

Findings from Sapir (2011:593-94) indicate that manufacturing SMEs focus on income, expenditure and tax to measure financial capital. De Burgos Jime´nez, Va´zquez-Brust and Plaza-U´beda (2013:982) state that manufacturing SMEs use accounting information to measure financial capital in their businesses.

Thus, based on the literature with regard to physical capital, it is found that manufacturing SMEs use lean practice to measure inventory (Krishnamurthy & Yauch, 2007:588-89; Jeffers, 2010:263): time to measure manufacturing processes (Robson, Haugh & Obeng): time on the products manufactured (Robson, Haugh & Obeng, 2009:346-47; Prusa, 2010:355); time to measure the stock delivered (Prusa, 2010:355); time to measure the utilisation of machine and equipment in the manufacturing processes (Rhee & Pyo, 2010:112-13; Bahri, St-Pierre & Sakka, 2011:608); time to measure the production management system (Bahri, St-Pierre & Sakka, 2011:608); time to measure supply chain in the manufacturing process (Khavul, Prater & Swafford, 2012:1155); innovation to measure the stock generated by the employee during the manufacturing process (Legros & Galia, 2012:172); energy to measure the utilisation of machine and equipment in the manufacturing process (Martínez & Silveria, 2013:129); and value of sales in relation to the cost of the resources used (Webster, Sudgen & Tayles, 2004:732).

In terms of financial capital, it appears to the literature that manufacturing SMEs measure expenditure and income earned (Tambunan, 2008:155); record keeping (Robson, Haugh & Obeng, 2009:346-47; De Burgos Jime´nez, Va´zquez-Brust & Plaza-U´beda, 2013:982); and financial statements (Bahri, St-Pierre & Sakka, 2011:604; Sapir, 2011:593-94) for operations in the manufacturing process.

2.5.2.3 Measuring management in manufacturing SMEs

Battisti and Iona (2009:738) report that management practices play an important role in the measurement of operational processes amongst manufacturing SMEs. The practices

investigated concern firstly, planning, which is the preparation of working time arrangement. Secondly, organisation of work, methods, computers or other types of new technologies to minimise unnecessary inventories is taken into account. Thirdly, leading practice, which focuses on management's communication with employees as well l as motivating employees through promotion criteria and merit incentives. Lastly, the control process also plays a critical role which involves tracking and reviewing of employees' performance by continually monitoring the quality of the operational work undertaken within manufacturing SMEs to ensure whether the targets have been reached (Battisti & Iona, 2009:738).

As is stated by Cravo, Gourlay and Becker (2012:228) manufacturing SMEs use entrepreneurial skills in measuring management. Ko and Buttler (2007:365) consider entrepreneurial skills to be the following necessary inputs; knowledge base, a well-developed social network and a strong focus of creativity on identifying opportunities. As is reported by Khavul, Prater and Swafford (2012:1152) manufacturing SMEs use not only entrepreneurial skills but also experience as a critical resource to measure management of the operational processes of manufacturing SMEs over which these SMEs have control.

According to Nagati and Rebolledo (2012:624), operational processes are measured through management's knowledge of improvement of quality, lead times and costs. The measures are based on the number of defects on the products produced and time deliveries for the products to be delivered. Planning is considered to be a critical measure in determining time-frame during which operational targets are supposed to be met by manufacturing SMEs. Furthermore, these manufacturing SMEs review these operational targets as the control process by comparing the actual operational performance against the planned target (Najmi, Etebari & Emami, 2012:1129-30).

Findings from Jagoda, Lonseth and Lonseth (2013:388) indicate manufacturing SMEs use planning and control through management to measure operational processes of their businesses. Furthermore, managers use leadership skills and communication skills to make the operational process of manufacturing SMEs successful. Da Silveira, Snider and Balakrishnan (2013:417-23) report that manufacturing SMEs use planning and control in terms of materials required and on what is to be manufactured in their businesses. Planning and control are also used by these SMEs to maintain levels of inventory required by the customers. In addition, motivation is used by management on employees to

measure their performance for improvement of operational processes within manufacturing SMEs.

Based on the literature, manufacturing SMEs use management to measure planning (Battisti & Iona, 2009:738; Najmi, Etebari & Emami, 2012:1129-30 Jagoda, Lonseth & Lonseth, 2013:388; Da Silveira, Snider & Balakrishnan, 2013:417-23; Najmi, Etebari & Emami, 2012:1129-30; Da Silveira, Snider and Balakrishnan, 2013:417-23); organising, leading (Jagoda, Lonseth & Lonseth, 2013:388); the control process (Battisti & Iona, 2009:738; Jagoda, Lonseth & Lonseth, 2013:388; Da Silveira, Snider & Balakrishnan, 2013:417-23); entrepreneurial skills (Gourlay & Becker, 2012:228; Ko & Buttler, 2007:365; (Khavul, Prater & Swafford, 2012:1152); experience ; management knowledge (Nagati & Rebolledo, 2012:624); motivation Da Silveira, Snider & Balakrishnan (2013:417-23) and communication (Jagoda, Lonseth & Lonseth, 2013:388) in their businesses.

2.6 Factors influencing productivity of manufacturing industries

Factors influencing productivity of manufacturing industries have been studied and discussed below. For instance, Belai (2007:65) reports that low productivity of manufacturing industries results from poor quality management, rising raw material prices, outdated technology, quality costs, limited skill training in quality and poor motivation. Gebreeyesus (2008:114-27) shows how turnover influences the productivity of manufacturing industries. The literature reports that increase in turnover positively contributes to the increase in productivity of manufacturing industries. Turnover means sales divided by average operating assets (Garrison, Noreen & Brewer, 2008:542).

As is stated by Fore and Msipha (2010:207), the study examines the relationship between maintenance and productivity in the manufacturing industry. Findings from the literature indicate that high equipment reliability and plant availability through maintenance contribute to increase in productivity of the manufacturing industry. As is defined by Stevenson (2009:727), maintenance is 'all activities that maintain facilities and equipment in good working order so that the system can perform as intended."

Ortega and Marchante (2010:200) investigate how temporary contracts influence the productivity of manufacturing industries. Findings from the literature show that temporary contract reduce the productivity of manufacturing industries due to low skill levels. Banda

and Verdugo (2011:293) explain that technology and human capital promotes productivity of manufacturing industries. Sharma (2008:974) considers human capital to be "knowledge, technical abilities, emotional strength or carrying capacity, and intellectual capital (also regarded as an intangible asset) of a family, and non-family members."

Hamit-Hagar (2011:360) reports how research and development and technology influence the productivity of manufacturing industries. Findings from the literature indicate that R&D and technology positively contribute to the improvement of productivity in manufacturing SMEs. Findings from Islam and Shazali (2011:567) indicate the relationship between skills, working environment, R&D and productivity of manufacturing industries. The study reports that when manufacturing industries experience lower working capacity of their workforce, unfavourable working environment and poor R&D intensity, low productivity appears in manufacturing industries.

Ramdas and Pretorius (2011:170) explain that productivity improvement can be achieved through the application of work study principles in manufacturing industries. Work study is considered as "the systematic examination of the methods of carrying out activities so as to improve the effective use of resources and to set up standards of performance for the activities being carried out" (Sookdeo, 2012:4).

As documented by Sutcu, Tanritanir, Dumusoglu & Koruca (2011:190), skilled labour contributes to the increase in productivity of manufacturing industries. Heshmati and Kim (2011:125-40) examines the relationship between R&D and the productivity of manufacturing industries. Findings from this literature indicate that investment in research and development positively influences the productivity of manufacturing industries. According to Sarwar, Ishaqe, Ehsan and Pirzada (2012:173), improved technology improves the productivity of manufacturing industries. Saxer, de Beer, and Dimitrov (2012:152) examine how technology and labour influence the productivity of manufacturing industries. Findings from the literature indicate that improved technology and skilled labour contribute to improved productivity of manufacturing industries. According to Legros and Galia (2012:167), employee skills, innovation and R&D increase the productivity of manufacturing industries.

Amin and Atre (2013:323); Kaur, Singh and Ahuja (2013:267) examine the influence of total productive maintenance (TPM) on productivity. Findings from this literature indicate

that TPM covers three areas namely, equipment, people and the workplace. Furthermore TPM is considered to be an innovative approach to maintenance that improves equipment effectiveness, eliminates breakdowns and promotes operator maintenance through day-to-day activities involving total work force. In view of the above literature, it is found that TPM enhances labour productivity in manufacturing industries. Stevenson (2009:55) defines labour productivity as "units of outputs per labour hour or per shift or value-added per labour hour."

Based on the findings from the literature review, with regard to factors influencing the productivity of manufacturing industries, it is found that poor quality management (Belai, 2007:65); high material prices (Belai, 2007:65); outdated technology (Belai, 2007:65); quality costs (Belai, 2007:65); lack of skills (Belai, 2007:65; Islam & Shazali, 2011:567; Sutcu, Tanritanir, Dumusoglu & Koruca, 2011:190; Saxer, de Beer, & Dimitrov, 2012:152); poor motivation (Belai, 2007:65); increase in turnover (Gebreeyesus, 2008:114-27) (Gebreeyesus, 2008:114-27); maintenance (Fore & Msipha, 2010:207); Amin and Atre, 2013:323; Kaur, Singh and Ahuja, 2013:267); temporary contract work (Ortega and Marchante, 2010:200); lack of technology (Banda & Verdugo, 2011:293; Hamit-Hagar, 2011:360; Sarwar, Ishaqe, Ehsan & Pirzada, 2012:173; Saxer, de Beer, & Dimitrov, 2012:152); human capital (Banda & Verdugo, 2011:293); research and development (Hamit-Hagar, 2011:360; Heshmati and Kim, 2011:125-40; Islam & Shazali, 2011:567; Saxer, de Beer, & Dimitrov, 2012:152) unfavourable working environment (Islam & Shazali, 2011:567); lack of work study application (Ramdas & Pretorius (2011:170); and innovation (Saxer, de Beer, & Dimitrov, 2012:152) influence the productivity of manufacturing industries.

2.7 Factors influencing the productivity of manufacturing SMEs

The question raised is: "Do all the factors influencing productivity of manufacturing industries also influence the productivity of manufacturing SMEs?" Factors that influence productivity of manufacturing SMEs are studied and addressed below. Factors addressed include measures such as labour, capital and management. Labour includes the factors ???such as; capital involves the following factors ??; and lastly management includes the following factors

2.7.1 Labour

Tambunan (2008:153-55) examines the relationship between skills and knowledge and productivity of manufacturing SMEs. Findings from the results indicate that manufacturing's lack of adequate skills and knowledge are the measure constraints affecting SME's low productivity.

Apergis, Economidou and Filippidis (2009:369) focus on the relationship between labour and productivity of manufacturing SMEs. Findings from the literature report that in terms of labour, employee education and skills positively influence the productivity of manufacturing SMEs in their businesses.

Bahri, St-Pierre and Sakka (2011:616) examine the influence of employee training on the productivity of manufacturing SMEs. The study appears to find employee training resulting in less rejected products and increased productivity. According to Cravo, Gourlay and Becker (2012:218-28) the study examines how employee education influences the productivity of manufacturing SMEs. Findings from the results point out that SMEs' employees with educational qualifications positively contribute to the productivity of manufacturing SMEs. Furthermore, manufacturing SMEs can use skill and knowledge of employees to increase productivity, making use of the abilities and innovative capacity of these employees.

As it is explained by Legros and Galia (2012:168-76) manufacturing SMEs have no interest in investing in training of employees. Lack of interest in training of employees results in the low productivity of these SMEs. Findings from the literature further indicate that as manufacturing SMEs adopt new equipment and new suppliers, training is required to support employees. As employees are exposed to equipment including full capacity changes in technology, training is required. Legros and Galia (2012:168) say that not only training of employees but also the setting of standards for the job being carried out by employee's play a vital role in improving the productivity of manufacturing SMEs.

Da Silveira, Snider and Balakrishnan (2013:419) state that motivation of employees is critical to the productivity of manufacturing employees. When employees are motivated, through compensation-based incentives, productivity amongst manufacturing SMEs increases. De Burgos Jime´nez, Va´zquez-B rust and Plaza-U´beda (2013:990)

examine the relationship between employee motivation and satisfaction and the productivity of manufacturing SMEs. Findings from the results show that greater employee motivation and satisfaction enhance productivity of manufacturing SMEs. As is reported by Hunt, Brien, Tormey, Alexander, McQuade and Hennessy (2013:504) the study examines the relationship between employee skill and knowledge and productivity of manufacturing SMEs. Based on the literature, employee skill and employee knowledge positively influence the productivity of manufacturing SMEs.

As is stated by van Hermert, Nijkamp and Masurel (2013:434) the study examines the relationship between employees' knowledge, skills, and experience and the productivity of manufacturing SMEs. Findings from the literature report that employees' knowledge, skills and experience positively contribute to the productivity of manufacturing SMEs.

Based on the findings from the literature review with regard to how labour influences the productivity of manufacturing SMEs, it is found that skills and knowledge (Tambunan, 2008:153-55; Apergis, Economidou & Filippidis, 2009:369; Cravo, Gourlay & Becker, 2012:218-28; Hunt, Brien, Tormey, Alexander, McQuade & Hennessy, 2013:504; (van Hermert, Nijkamp & Masurel, 2013:434); education (Economidou & Filippidis, 2009:369; Cravo, Gourlay & Becker, 2012:218-28); training (Bahri, St-Pierre & Sakka, 2011:616; Legros & Galia, 2012:168-76): setting of standards (Legros & Galia, 2012:168-76); employee motivation (Da Silveira, Snider & Balakrishnan, 2013:419; De Burgos Jime´nez, Va´zquez-Brust & Plaza-U´beda, 2013:990); and experience (van Hermert, Nijkamp & Masurel, 2013:434) are critical to the productivity of manufacturing SMEs.

2.7.2 Capital

2.7.2.1 Physical Capital

Gebreeyesus (2008:125) examines the relationship between sales turnover and productivity in manufacturing SMEs. Findings from the literature indicate that sales turnover influences the productivity of manufacturing SMEs. High contribution of sales turnover improves the productivity of manufacturing SMEs.

Krishnamurthy and Yauch (2007:598) suggests that lean implementation is critical to manufacturing SMEs since SMEs have smaller production units which enable them to focus on lower inventory both for work in process and finished goods. These small

production units help make lean implementation more effective. Consequently, the effectiveness of this unit leads to productivity improvement of manufacturing SMEs.

Jeffers (2010:261-63) emphasises that lean production eliminates waste by focusing on minimal inventory with regard to raw material, work-in-process and finished goods in manufacturing SMEs. Minimal inventory in turn improves the productivity of manufacturing SMEs.

According to Bahri, St-Pierre and Sakka (2011:616) suitability of equipment and machines as well as incorporation of production management systems in manufacturing SMEs lead to the improvement of productivity in SMEs businesses. Furthermore, the study reports that reducing defects also results in improvement of productivity amongst manufacturing SMEs.

Nonthaleerak and Hendry (2008:282); Braunscheidel, Hamister, Suresh and Star (2011:431); Choi and Kim (2012:529) examine the relationship between Six Sigma and the productivity of manufacturing SMEs. Findings from the literature report that Six Sigma improves the quality of the manufacturing process by eliminating costs and defects and in turn the productivity of manufacturing industries. Sáchez and Benito-Hernández (2013:15) emphasise that improvement in process, for example through increased sales, positively contributes to the increased productivity of manufacturing SMEs.

2.7.2.2 Financial Capital

Government expenditure to finance manufacturing SMEs has a positive impact on the productivity of SMEs businesses. Findings from the literature indicate that this expenditure by the government to manufacturing SMEs improves the productivity of these SMEs' businesses (Tambunan, 2008:147). Robson, Haugh and Obeng (2009:346-47) state that manufacturing SMEs, without the inability to recruit qualified managerial and technical employees due to inadequate finance, show lower productivity.

Although additional costs are incurred in maintaining equipment to be utilised in the manufacturing process, expenditure spent on this maintenance in manufacturing SMEs appears to have a positive impact on the productivity of SMEs' businesses (Bahri, St-Pierre and Sakka, 2011:608). Gashi, Hashi and Pugh (2013:1) examine the influence of finance on productivity of manufacturing SMEs. Findings from the literature indicate that

access to finance positively contributes to the productivity of manufacturing SMEs. The difficulties facing manufacturing industries when they are not improving the productivity of their businesses include lack of knowledge in utilising financial ratios and reluctance to consider evaluation of their financial performance. The study reports that it is difficult to determine how efficiently manufacturing businesses are operating (Sohn & Kim, 2013:94).

Based on the findings from the literature review with regard to physical capital, it appears that sales turnover (Gebreeyesus, 2008:125); lean practice (Krishnamurthy & Yauch, 2007:598); Jeffers, 2010:261-63) proper utilisation of machine, equipment and processes (Bahri, St-Pierre & Sakka, 2011:616); and Six Sigma (Nonthaleerak & Hendry, 2008:282); Braunscheidel, Hamister, Suresh & Star, 2011:431; Choi & Kim, 2012:529) have an impact on the productivity of manufacturing SMEs.

Furthermore, in terms of financial capital, it is found that government expenditure to finance manufacturing SMEs (Tambunan, 2008:147); inadequate finance (Robson, Haugh & Obeng (2009:346-47); expenditure in maintaining machine, equipment and operations (Bahri, St-Pierre & Sakka, 2011:608); access to finance (Gashi, Hashi & Pugh, 2013:1); and lack of knowledge and reluctance to evaluation of the financial performance (Sohn & Kim, 2013:94) also contribute to the productivity of manufacturing SMEs.

2.7.3 Management

Avram and Kühne (2008:467); Kumar, Singh and Shankar (2013:81-90) advise that improved coordination of a supply chain in the manufacturing process amongst manufacturing SMEs leads to improvement of productivity. Coordination is concerned with many activities in industries such as integration of process of one supply chain with process of other supply chain through information sharing, relationship management and transfer of technology.

When there is little or no technology used by managers within manufacturing SMEs, low levels of productivity arises in the businesses of these SMEs (Tambunan, 2008:149). Esteve-Pérez, Máñez-Castillejo and Sanchis-Llopis (2008:84) study the relationship between management and productivity of manufacturing SMEs. Findings from the literature report that lack of management skills and management incompetence negatively influence the productivity of manufacturing SMEs.

Mahmood (2008:54) points out that improved management skills through new technology such as information and communication technology (ICT) increase productivity of manufacturing SMEs. Battisti and Iona (2009:727) examine the influence of management practices on the productivity of manufacturing SMEs. Findings from the literature suggest that management practices are positively contributing to the productivity of manufacturing SMEs. According to Hall, Lotti and Mairesse (2009:16); Rhee & Pyo (2010:124); Carayannis and Grigoroudis (2012:1); Castillo, Maffioli, Rojo and Stucchi (2013:2); Price, Stoica and Boncella (2013:1), the research examines the relationship between innovation and productivity of manufacturing SMEs. Findings from the literature indicate that manufacturing SMEs play an important role in innovation by testing and introducing new products. As a result, innovation through the generation of new products improves the productivity of manufacturing SMEs.

Bahri, St-Pierre and Sakka (2011:604) report that limited resources and lack of managerial expertise negatively result in the productivity of manufacturing SMEs. Lack of managerial expertise makes it difficult for manufacturing SMEs to control and steer their businesses in the right direction for productivity improvement. Lack of technology in manufacturing SMEs results in low productivity of SMEs' businesses (Maté-Sánchez-Val and Madrid-Guijarro, 2011:354)

Cravo, Gourlay and Becker (2012:218) explain how education influences the productivity of manufacturing SMEs. Findings from the results point out that SME owners and staff with an educational background positively contribute to the productivity of manufacturing SMEs. As it is stated by Sandulli, Fernández-Menéndez, Rodríguez-Duarte and López-Sánchez, (2012: 99), use of information technology (IT) in manufacturing or operational processes amongst manufacturing SMEs is found to be associated with improvement in productivity of SMEs' businesses. Lack of knowledge and poor planning negatively influence the productivity of manufacturing SMEs. Findings from the literature report that when there is lack of industry knowledge and poor planning, productivity of manufacturing SMEs declines (Islam & Tedford, 2012:2-3).

Coffey, Tate and Toland (2013:764) explain that manufacturing SMEs suffer from lack of education and training with regard to greening the environment where manufacturing processes are taking place. As a result, lack of education training in improving the

environment where the manufacturing process takes place leads to a decrease in productivity and in turn, inefficiency in the business of manufacturing SMEs. Hermert, Nijkamp and Masurel (2013:434) examine the relationship between knowledge, skills, experience of employees and the productivity of manufacturing SMEs. Findings from the literature report that managers' knowledge, skills and experience positively contribute to the productivity of manufacturing SMEs.

Jagoda, Lonseth and Lonseth (2013:402) point out that a bottom-up approach is critical to productivity improvement of manufacturing SMEs. Findings from the literature indicate that the bottom-up approach enables employees to take the lead with improvement of productivity amongst manufacturing industries as well as assisting managers to focus on long-term improvements.

Based on the findings from the literature review with regard to how labour influences the productivity of manufacturing SMEs, it is a presumption to the literature that coordination of supply chain (Avram & Kühne, 2008:467); Kumar, Singh & Shankar, 2013:81-90) technology (Tambunan, 2008:149; Maté-Sánchez-Val & Madrid-Guijarro, 2011:354; Sandulli, Fernández-Menéndez, Rodríguez-Duarte & López-Sánchez, 2012: 99) management skills (Esteve-Pérez, Máñez-Castillejo & Sanchis-Llopis, 2008:84; Mahmood, 2008:54; Battisti & Iona, 2009:727); management competence (Esteve-Pérez, Máñez-Castillejo & Sanchis-Llopis, 2008:84); innovation (Hall, Lotti & Mairesse, 2009:16; Rhee & Pyo, 2010:124; Carayannis & Grigoroudis, 2012:1; Castillo, Maffioli, Rojo & Stucchi, 2013:2; Price, Stoica & Boncella, 2013:1); managerial expertise (Bahri, St-Pierre & Sakka, 2011:604); education (Cravo, Gourlay & Becker, 2012:218; Coffey, Tate and Toland (2013:764); knowledge (Islam & Tedford, 2012:2-3; Hermert, Nijkamp & Masurel, 2013:434); planning (Islam & Tedford, 2012:2-3); training Coffey, Tate and Toland (2013:764) skills (Hermert, Nijkamp & Masurel, 2013:434); experience (Hermert, Nijkamp & Masurel, 2013:434); and a bottom-up approach (Jagoda, Lonseth & Lonseth (2013:402) play a vital role in the productivity of manufacturing SMEs.

2.8 The background of inefficiency

Bismith and Tojo (2008:233); Harrington, Boyd, Ramsey and Ibbotson (2008:484-86) report that inefficiency involves non availability of technology where customers are not

provided with access in a wide range of products and services accompanied by the relevant information.

As it is pointed out by Sharma and Sharma (2010:59), inefficiency entails reducing output extensively in the industry, be it large or small. Chinese & Ghirardo (2010:157) say that inefficiency focuses on loss of asset availability such as, machinery and/or equipment caused by stops due to reactive or delayed maintenance. Settanni and Emblemsvåg (2010:246) explain that inefficiency involves waste of material and/or product due to spoilage and scrap in the manufacturing process within the industry.

Findings from the literature report that inefficiency includes lack of trust and need for social capital in industries be they large or small (Berggren & Silver, 2009:125). By social capital, Fatoki (2011:196) means "the actual and potential resources rooted in the network relationship that are accessed and used by, for example, business managers for business activities, be they internal or external. Internal social capital means the structure and social networking relationships amongst individual members within a system or organisation, whereas external social capital entails the structure and social networking relationships outside the system or organisation."

Inefficiency focuses on the extent to which industries within their manufacturing processes fail to match best practices within the industry (Smith & Wheat, 2012:27). As it is stated by Okello-Obura (2012:449), inefficiency entails poor business operations due to poor management practices within the industry, irrespective of the size.

Findings from Gupta, Acharya and Patwardhan (2013:638-44) report that inefficiency involves waste due to inventory waiting; lack of skilled employees; underutilisation of human resources; over-processing; defects/scrap; unavailability of material; improper scheduling and poor management

According to Jahanshati and & Zhang (2013:851), inefficiency involves failure of technology due to failure of maintenance of technology to make the manufacturing process a success within the industry, regardless of the size.

Thus, it appears to the literature that inefficiency involves non-availability of technology (Bismith & Tojo (2008:233; Harrington, Boyd, Ramsey & Ibbotson, 2008:484-86); extensive reduction of output (Sharma & Sharma, 2010:59), loss of asset availability due

to reactive or delayed maintenance (Chinese & Ghirardo, 2010:157); waste of material and/or product due to spoilage and scrap (Settanni & Emblemsvåg, 2010:246; (Gupta, Acharya & Patwardhan, 2013:638-44); lack of trust and need for social capital towards management by employees (Berggren & Silver, 2009:125); failing to match best practices within the industry (Smith & Wheat, 2012:27); poor operations due to poor management practices (Okello-Obura, 2012:449); waste due to inventory waiting; lack of skilled employees; underutilisation of human resources; over-processing; unavailability of material; improper scheduling and poor management (Gupta, Acharya & Patwardhan, 2013:638-44); and failure of technology due to lack of maintenance on technology (Jahanshati & Zhang, 2013:851)

2.9 Inefficiency in manufacturing industries

Inefficiency in manufacturing industries is studied and discussed below. According to Saggay, Heshmati and Dhif (2007:150), inefficiency becomes a critical factor in manufacturing industries. An increase in price is a result of greater competitiveness of markets, goods and inflow of foreign and increased direct investments which demand knowledge transfer and opportunities towards professional expertise. If knowledge and professional expertise are non-existent, the result of competitive markets, goods and inflow of foreign and increased direct investments contributes to the inefficiency amongst manufacturing industries. As is reported by Wadhwa, Bibhusan, Bhoon and Chan (2008:367-71), there is a need for knowledge driven innovation for manufacturing industries to improve the manufacturing process. Findings from the literature report that lack of management knowledge delays the manufacturing process. The manufacturing process becomes inefficient in making manufacturing industries capable of generating its products and rendering its services. Furthermore, knowledge management is defined as "management of organisational knowledge, for example, creating business value, growth and generating a competitive advantage.

Rezaie, Dehghanbaghi and Ebrahimipour (2009:613) advises that raw material, workforce and investments are the most critical variables to which manufacturing industries should pay more attention, as they lead to inefficiency. Findings from the literature report that inefficiency involves lack of material, poor workforce and absence of investments which lead to failure in the manufacturing processes amongst manufacturing industries. As a result, failure of these manufacturing processes negatively contributes to the productivity

of manufacturing industries in their businesses. Badunenko (2010:423) says that manufacturing industries experience inefficiencies in their businesses due to lack of technological change and performance of the business due to the industry not keeping abreast with innovation.

As was discovered by Oyedepo and Saadu (2010:462), policies are violated by bodies within manufacturing industries. These policies limit high levels of occupational noise and promote education of workers regarding awareness of ill effects of high levels of noise. This violation results from inefficiency of statutory bodies. In addition to ill effects amongst employees in their manufacturing functions, high noise results in poor performance of employees and hinders the communication between employees during their period of working. These lead to inefficiency amongst manufacturing industries.

Lobo e Silva and Hewings (2012:716) emphasise the importance of communication within manufacturing industries between manager/owner and subordinates. Long distance communication may be diluted when managers/owners delegate information to subordinates. Findings from the results indicate that the absence of communication between manager/owner and subordinates ultimately results in inefficiency in the manufacturing processes. Liu and Nishijima (2013:372) report that inefficiency results from lack of technological change in manufacturing industries. As a result, productivity of manufacturing industries declines.

Das, Venkatadri and Pandey (2013:17) state that employee training is critical to the efficiency of the manufacturing process amongst manufacturing industries. Based on the literature, lack of training makes the manufacturing process inefficient by reducing set up standard time for machine and/or processes used.

Based on the findings from the literature review with regard to the background of inefficiency in manufacturing industries, it is found that lack of knowledge transfer and shortage of professional expertise (Saggay, Heshmati & Dhif, 2007:150); lack of knowledge management (Wadhwa, Bibhusan, Bhoon & Chan, 2008:367-71); lack of material, poor workforce and absence of investments (Rezaie, Dehghanbaghi & Ebrahimipour, (2009:613); lack of technological change (Badunenko, 2010:423; Liu & Nishijima, 2013:372); bridging of policies by government towards manufacturing industries (Oyedepo & Saadu, 2010:462); lack of communication (Oyedepo & Saadu, 2010:462; Lobo e Silva & Hewings, 2012:716); and absence of training (Das, Venkatadri & Pandey,

2013:17) results in inefficiency in the manufacturing process amongst manufacturing industries.

2.10 Inefficiency in manufacturing SMEs

Natarajan and Duraisamy (2008:390) explain that shortage of working capital hinders the ability of manufacturing SMEs to invest in equipment and labour. Studies have indicated that investment and growth potential are reduced by credit constraint. Ahmad and Qiu (2009:79) point out that the ability of manufacturing SMEs to innovate and bring to market would be improved through the use of new technologies. Lack of these facilities result in inefficiency of the business.

According to Masood and Weston (2011:410), the aim of manufacturing SMEs in their manufacturing process is to produce quality products with the intention of reducing inefficiencies. The study indicates that inefficiencies in manufacturing SMEs result in waste, inability to respond to the requirements and the inability to conform to customers' satisfaction levels.

Razak, Kamaruddin and Azid (2012:24-5) advise that inefficiency in manufacturing SMEs involves poor repairs and poor maintenance which cause machine and equipment breakdown. The breakdown of machine and equipment negatively affects the efficiency of the manufacturing process and timely deliveries amongst manufacturing SMEs. Poor repairs and maintenance can often be traced to a lack of employee skills which contributes to errors. Consequently, the lack of employee skill results in a decline in productivity of manufacturing SMEs. Kello-Obura (2012:449), report that inefficiency not only involves poor business operations due to poor management practices within the large manufacturing industry, but also within manufacturing SMEs. As a result, poor management practices negatively contribute to the productivity of these SMEs.

Findings from the literature refer to maintenance as "the combination of technical, administrative, and managerial actions for the purpose of retaining and restoring an item to a state in which it can perform its required function" (Razak, Kamaruddin & Azid, 2012:24-5)

Based on the literature, it is found that a shortage of working capital (Natarajan & Duraisamy, 2008:390); ability to be innovative and change of technology (Ahmad & Qiu, 2009:79); lack of customer focus (Masood & Weston, 2011:410); poor repairs, poor maintenance and lack of employee skills (Razak, Kamaruddin & Azid, 2012:24-5) result in inefficiency of manufacturing industries.

2.11 The background of efficiency

Efficiency in an industry is when the industry utilises its resource input by complying with the set standards (Yeung & Mok, 2008:390). Case, Fair and Oster (2009:46) classify efficiency into physics and economics. In terms of physics, efficiency refers to "the ratio of useful energy delivered by a system to energy supplied to it. In terms of economics, efficiency means allocative efficiency; the economy produces goods and services that people want at the least possible cost."

Efficiency involves appropriate use of technology where time is saved and inventory levels are reduced (Harrington, Boyd, Ramsey & Ibbotson, 2008:486; Jahanshati & Zhang, 2013:851). According to Sharma and Sharma (2010:59), efficiency is concerned with increasing output for a given set of input. This increased output with a given set of input shows how industries can increase their output with constant input.

Li, Deng and Sorensen (2011:67-74) point out that efficiency is concerned with the flow and interaction of innovation resources such as knowledge, funds, equipment, personnel (human resources) including experience useful to generate new knowledge or service in order to make the manufacturing process successful.

According to Maté-Sánchez-Val and Madrid-Guijarro (2011:354), efficiency shows how well each productive unit combines its resources to obtain the highest production level using specific technology. However, this productive unit becomes inefficient if it cannot produce more of any particular output without decreasing some other output or consuming more input. As is explained by Zhang and Gregory (2011:744), efficiency means how inexpensively the resources are exploited to produce the output.

Efficiency based on technology is considered to be technical efficiency as it is indicated by findings from the literature (Roudaut & Vanhems, 2012:165). According to Broberg,

Marklund, Samakovlis and Hammar (2013:1), technical efficiency means "the measure of how a firm's performance relates to a reference technology at a certain point in time."

Heizer and Render (2011:45) say efficiency in terms of manufacturing means doing the job with a minimum of resources and waste. Furthermore, the more productive manufacturing businesses are, whether large businesses or small SMEs, the more efficiently the manufacturing businesses will operate. As a result, an efficient operation will bring more value to goods and services provided.

Brax and Johnsson (2009:545) advise that efficiency is enhanced by improving equipment design and avoiding waste. Efficiency is improved through quality and skills. Efficiency occurs when defects and rework are reduced. There is little disruption to production and planning processes ensure customers' orders are filled (Qi, Sum & Zhao, 2009:654). As is discovered by Bhandari and Maiti (2012: 75), efficiency is measured by comparing the observed value of the output and input. The comparison can be made either between observed output or output obtainable from given quantities.

Efficiency is concerned with improvement of coordination processes or activities between functions to make the decision-making processes a success. These processes satisfy both external and internal customers (Okello-Obura, 2012:449).

Gupta, Acharya and Patwardhan (2013:635-38) report that efficiency focuses on waste elimination through the use of lean manufacturing such as proper planning and communication; production planning and control; improving labour and machine productivity; elimination of defects and scraps; improved manufacturing or production process; Just-in-time delivery; improving quality; employee motivation; and employee expertise and skills in the manufacturing process.

Based on the findings of the literature review, it is found that efficiency entails industry compliance with set standards (Yeung & Mok, 2008:390); the ratio of useful energy delivered by a system to energy supplied to it (in terms of physics) and means the economy that produces goods and services that people want at the least possible cost (in terms of economics)," (Case, Fair & Oster, 2009:46); improving equipment design and avoiding waste (Brax and Johnsson, 2009:545); when there is quality, and skills, defects and rework are reduced (Qi, Sum & Zhao, 2009:654); increasing output for a given set of

input (Sharma & Sharma, 2010:59); doing the job with a minimum of resources and waste (Heizer & Render, 2011:45); the flow and interaction of innovation resources (Li, Deng & Sorensen, 2011:67-74); how well each productive unit is combining its resources to obtain the highest production level using specific technology (Maté-Sánchez-Val & Madrid-Guijarro, 2011:354); how inexpensively resources are exploited to produce the output (Zhang & Gregory, 2011:744); comparing the observed value of the output and input (Bhandari & Maiti, 2012: 75); improvement of coordination processes or activities between functions to make the decision-making processes a success (Okello-Obura, 2012:449); appropriate use of technology where time is saved and inventory levels are reduced (Harrington, Boyd, Ramsey & Ibbotson, 2008:486; Roudaut & Vanhems, 2012:165; Jahanshati & Zhang, 2013:851); "the measure of how a firm's performance relates to a reference technology at a certain point in time," (Broberg, Marklund, Samakovlis & Hammar, 2013:1); and the elimination of waste through the use of lean manufacturing (Gupta, Acharya & Patwardhan, 2013:635-38) .

2.12 Efficiency in manufacturing industries

The background of efficiency in manufacturing industries in the manufacturing process studied and discussed below. Cho, Seong and Shin (2008:841) state efficiency results from innovative activities that contribute to improvement of product quality and performance within manufacturing industries.

Availability of raw material, workforce, and investment are regarded as the most important variables that managers can focus on so the manufacturing process among manufacturing industries is efficient (Rezaie, Dehghanbaghi & Ebrahimipour, 2009:615). Tassey (2010:291) advises that efficiency facilitates communication when there is new and improved technology infrastructures in the manufacturing processes amongst manufacturing industries. As discovered by Gao, Yao, Zhu, Sun and Lin (2011:439) more specialised equipment, knowledge, skills and standard operating procedures are employed which accelerate efficiency in the manufacturing processes amongst manufacturing industries.

García, Rivera and Iniesta (2013:537) explain that the provision of education and training to employees; communication; control; human resources integration; management commitment and customer focus play vital roles in manufacturing industries. As a result,

the presence of these variables lead manufacturing industries to efficiency in their businesses. Kang, Lee, Hwang and Chang (2013:1390) set a caution that managing risk in technology plays a vital role in the manufacturing process amongst manufacturing industries. Findings from the literature report that managing risk in the manufacturing process monitors dangers and therefore improves the efficiency of the manufacturing processes amongst manufacturing industries. Liu and Nishijima (2013:374) suggest that employee training plays a vital role in the efficiency of manufacturing industries. Findings from the literature report that when employees are trained to carry out activities in the manufacturing process of manufacturing industries, this contributes to the efficiency of manufacturing industries. A foreign work force with a high level of education positively contributes to the efficiency of manufacturing industries in their businesses (Mueller, 2013, 1).

According to Martínez and Silveria (2013:123-30), energy, especially electricity and fuel, used on machinery and equipment is often used as the indicator of progress in the manufacturing process amongst manufacturing industries. Awareness of the careful use of energy as well as the scarcity of resources is regarded as an important move towards efficiency of manufacturing industries. Ramli, Munisamy and Arabi (2013:383) state that efficiency is concerned with the ability to increase output while keeping the input constant. Furthermore, the study indicates that efficiency also focuses on keeping the output constant while reducing input. Based on the literature, efficiency can be either single or multiple input and output which arise through the manufacturing process amongst manufacturing industries.

Thus it appears on the literature that innovation (Cho, Seong & Shin, 2008:841); availability of raw material, workforce, and investment (Rezaie, Dehghanbaghi & Ebrahimipour, 2009:615); improved technology infrastructures (Tassey, 2010:291); more specialised equipment, knowledge, skills and procedures (Gao, Yao, Zhu, Sun & Lin, 2011:439); communication; control; human resources integration; management commitment and customer focus (García, Rivera & Iniesta, 2013:537); managing risk in technology (Kang, Lee, Hwang & Chang, 2013:1390); employee training (García, Rivera & Iniesta, 2013:537; Liu & Nishijima, 2013:374); employee education (García, Rivera & Iniesta, 2013:537; Mueller, 2013, 1); energy (Martínez & Silveria,2013:123-30); and ability to increase output while keeping the input constant as well as keeping the output constant

while reducing input (Ramli, Munisamy & Arabi (2013:383) play a vital role in improving the efficiency in the manufacturing process amongst manufacturing industries.

2.13 A theoretical background of how efficiency improves the productivity of manufacturing SMEs

As is stated by Margaritis and Grosskopf (2007:103), efficiency improvements are making a strong contribution to productivity in manufacturing SMEs. It appears from the results that efficiency with the transfer and diffusion of technology and capital accumulation is the driving force of productivity growth.

Efficiency in an industry is when the industry utilises the level of its resource input and complies with set standards. This allows manufacturing SMEs to improve in efficiency and in turn, to increase productivity in their businesses. (Yeung & Mok, 2008:385). Efficiency makes operations management less costly through better maintenance or resources (Fore & Msipha, 2010:232). Terzioski (2010:895) comments that manufacturing SMEs rely on functional specialisations (qualified experts in their relevant sphere of operations) in order to improve the efficiency of the manufacturing process which in turn improves productivity of their businesses.

Findings from the literature suggest that increasing output with reduced energy consumption in manufacturing SMEs is a critical manufacturing process which increases productivity. This impacts positively on the efficiency of manufacturing SMEs. Efficiency prevails if management monitors, measures, records, analyses, critically examines, controls and redirects energy and material flow through the manufacturing process so that less power is expended to improve the productivity of manufacturing SMEs (Bunse, Vodicka, Schönsleben, Brülhart & Ernst, 2011:668-74).

Roudaut and Vanhems (2012:155) state that efficiency is used to measure the input to output operation of manufacturing SMEs in order to determine how manufacturing industries combine their inputs to produce their outputs without waste. By the same token, Urban and Naidoo (2012:147) point out that efficient operation assists manufacturing SMEs to improve in productivity. This can be done through the provision of accessible and appropriate skills. Manufacturing industries secure environmental improvements and can improve efficiency if they abide by environmental regulations (Alexopoulos, Kounetas &

Tzelepis, 2012:8). According to Oeij, De Looze, Have, Van Rhijn and Kuijt-Evers (2012:94), monitoring and management of productivity also increases efficiency within manufacturing industries. Based on the findings of the literature review, efficiency contributes to productivity improvement of manufacturing industries through attainment of outputs in relation to appropriate utilisation of resources.

As is pointed out by Razak, Kamaruddin and Azid (2012:25) maintenance plays a vital role in the manufacturing process of manufacturing SMEs through its dependence on equipment conditions. Its contribution strengthens the efficiency of the manufacturing process improving equipment's lifespan, reliability and availability without causing harm to employees and the environment. According to Desai, Antony and Patel (2012:427) ix Sigma removes causes of variations or defects in the manufacturing process of manufacturing SMEs with the intention of improving efficiency of their businesses. This technique addresses the major contributors of results in terms of improvements needed and time span set. The improvement needed and time span set delivers the results of productivity.

Schläfke, Silvi and Möller (2013:119) set a guideline that efficiency is enhanced by cutting costs caused by unnecessary spending of time on poorly managed tasks. Managers in manufacturing SMEs learn from changes of markets and customers' behaviour. Kaur, Singh and Ahuja (2013:70-9) advise that, in terms of efficiency in manufacturing SMEs, maintenance on machinery and equipment is use ensures that products are produced at the required quantity and quality levels. Findings from the literature indicate that productivity enhancement amongst these manufacturing SMEs can be realised through efficient planning of structured maintenance.

With efficiency, TQM is applied to help manufacturing SMEs improve the productivity of their businesses by removing waste; involving everyone in the manufacturing processes; coordinating efforts of all employees through continuous quality improvement; and committing employees to a culture of customer satisfaction (Singh & Sushil, 2013:251). According to Prashar (2014:105), improvement of efficiency in manufacturing SMEs can be done through the implementation of Six Sigma.

Based on the literature discussed, it appears that efficiency with diffusion of technology and capital accumulation (Margaritis & Grosskopf, 2007:103), utilisation of level of input resources by compliance with the set standards (Yeung & Mok, 2008:385); less costly

operations management through better maintenance or resources (Fore & Msipha, 2010:232); functional specialisations (Terzioski, 2010:895); increasing output with reduced energy consumption (Bunse, Vodicka, Schönsleben, Brülhart & Ernst, 2011:668-74); combining inputs to produce outputs without waste (Roudaut & Vanhems (2012:155); utilisation of accessible and appropriate skills (Urban & Naidoo, 2012:147); abiding by the environment regulations (Alexopoulos, Kounetas & Tzelepis, 2012:8); monitoring and management of productivity through attainment of outputs in relation to appropriate utilisation of resources (Oeij, De Looze, Have, Van Rhijn & Kuijt-Evers (2012:94); maintenance of manufacturing process through machinery and equipment conditions (Razak, Kamaruddin & Azid, 2012:25; Kaur, Singh & Ahuja (2013:70-9); implementation of Six Sigma (Desai, Antony & Patel, 2012:427; Prashar, 2014:105)); cutting costs caused by unnecessary spending of time on poorly managed tasks (Schläfke, Silvi & Möller (2013:119); and total quality management by involving everyone in the manufacturing process (Singh & Sushil, 2013:251), are driving forces to in productivity improvement in manufacturing SMEs.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This section focuses on the research methodology used in order to understand how productivity influences manufacturing SMEs in the Gauteng region. The aim of this study is to investigate on the productivity of manufacturing SMEs and to examine whether efficiency can contribute to the improvement of productivity amongst manufacturing SMEs around the Gauteng region. Findings from Nel, et al. (2011:3), state manufacturing industries need to improve their productivity in order to sustain business and be successful in the current South African economy.

3.2 Research design

According to Cooper & Schindler (2011: 727), research design is a blueprint for collection, measurement and analysis of data. The definition of research design is simplified as fulfilling research objectives and answering questions. The aim of research design is to examine the relationship between efficiency (independent variable) and its influence on productivity of manufacturing SMEs (dependent variables). The research was exploratory, descriptive and quantitative in nature. It will focus on productivity and its influence on manufacturing SMEs. Exploratory research involves the researchers lacking a clear idea of the problems they have to meet during the study (Cooper & Schindler (2011:727). The study explore on how efficiency influence productivity into manufacturing SMEs. According to Cooper and Schindler (2011:726) quantitative research is "the precise count of some behaviour, knowledge, opinion, or attitude. Such methodology answer questions related to how much, how often, how many, when, and who."

Based on the background of the study as it is indicated by Cooper and Schindler (2011:220-25), under types of experimental designs the research focused on descriptive study to attempt to describe and define the subject by creating a profile of a group of problems amongst manufacturing SMEs around the Gauteng region through the collection of data from each owner or manager of the SMEs and the tabulation of the frequencies on the research variables or their interaction (Cooper & Schindler, 2011: 727).

The respondents were measured only once, using efficiency as a measure to examine productivity of the manufacturing SMEs in the West of Industria around the Gauteng Region. The aim of the research design was to ensure whether efficiency positively contribute to the improvement of productivity amongst the manufacturing SMEs (Cooper & Schindler, 2011:220-26).

3.3 Population

The study looked at manufacturing SMEs in the West of Industria around the Gauteng Region and focused on a population that included survivalists, micro, very small, small and medium business enterprises. West of Industria is located about 9 km from Johannesburg, around the Gauteng region (DistanceFrom.com, 2013). Cooper and Schindler (2011:724) refer to population as "the elements about which we wish to make some inferences. The size of the population usually makes it impractical and uneconomical to involve all members of the population in a research project and thus a sample of the population is usually taken. In this case the research conducted focused on the data obtained from a sample of the population. As indicated by the respondents there were 200 SMEs operating in the West of Industria of which 50% of them were affected by fire. Out of 50% of those businesses that are existing 60 of them are manufacturing SMEs.

3.4 Sampling

Cooper and Schindler (2011:727) refer to sampling as "the process of selecting some elements from a population to represent that population." Sampling is divided into probability sampling and non-probability sampling. As is explained by Saunders, *et al.* (2009:212), with probability sampling, the chances, or probability, of each case being selected from the population is known and is usually equal for all cases. Whereas, to the contrary, using non-probability sampling, the probability of each case being selected from the total population is not known and it is impossible to answer research questions or to address objectives that require the research to make statistical inferences about the characteristics of the population. Since the research questions will address objectives that require the research to make statistical inferences about the characteristics of the population, a probability sample will be used to ensure that each member of the population

amongst SMEs is given a non-zero chance of selection (Cooper & Schindler, 2011:725). Primary data was collected through visit (personal contact) of manufacturing SMEs in the West of Industria around Gauteng region. Simple random sampling was used as the research ensured that sets of numbers that were random were identical, (Saunders, *et al.*, 2009:223). As it is defined by Cooper and Schindler (2011:728), simple random sampling is "a probability sample in which each element has a known and equal chance of selection." A response rate of 68.3% (41 respondents) was obtained from a sample of 60 businesses.

3.5 Data collection

Secondary data was collected by means of various literatures sources about SMEs. Personal contacts were made to communicate with manufacturing SME respondents during the follow-up period. As indicated by Cooper and Schindler (2011:361), during personal contacts, the researcher can improve the quality of the information received as opposed to, for example, information received using a self-administered questionnaire, Cooper and Schindler (2011:727), the list of questions to be utilised were prepared in the data collection questionnaires. Manufacturing SMEs were approached in their specific zones in which they operate in the West of Industria. Research questionnaires were distributed to various SMEs respondents since their businesses were too close to each other. So, it became easier to distribute the research questionnaire from one respondent to the other and collect it after every 20 to 30 minutes.

3.6 Measurement scale of the research questionnaire in the study

According to Cooper and Schindler (2011:274), there are four measurement scales used in the study namely nominal, ordinal, interval and ratio. Each of these depends on the researcher's use of mapping rules. By mapping rule, Cooper and Schindler (2011:722) mean "a scheme for assigning numbers or symbols to represent aspects of the event being measured."

As is explained by Hair, Black, Babin and Anderson (2010:5), this means that a nominal scale can only provide a certain number of occurrences in each class or category of a variable being studied. Cooper and Schindler (2011:276) claim that ordinal scale involves researchers looking at a person or object that may have more or less characteristics than

another person or object. Hair, *et al.* (2010:5) support that variables, in an ordinal scale, can be ordered or ranked in relation to the amount of attribute processed, for example, "greater than" or "less than" relationship. Leedy and Omrod (2010:27) characterise interval scale into two features. Firstly, this scale has equal units of measurement. Secondly, its zero point has been established arbitrarily. Interval scale will be used in terms of the distances in periods for comparing output to input performance of manufacturing SMEs in the Gauteng region. The last scale, ratio scale, is a scale with the properties of categorisation, order, equal intervals and unique origin (Cooper & Schindler, 2011:726). Only nominal and ordinal as measurement scales were included in the research questionnaire for measuring respondents amongst manufacturing SMEs in the West of Industria around the Gauteng region. The purpose of using a nominal scale is that the research was looking at collecting information on a variable with regard to respondents amongst manufacturing SMEs in the West of Industria, in this case, gender, where design can be grouped into two or more categories that are mutually exclusive and collectively exhaustive. Ordinal scale was also used in terms of the comparable sizes of manufacturing SMEs.

3.7 Measurement instrument

The measurement instrument focused on two sources of data to gather data, namely secondary data and primary data.

3.7.1 Secondary data

Secondary data involves results of studies done by others and for different purposes than the one for which the data is being reviewed (Cooper & Schindler, 2011:727). Secondary data concerning was collected through the literature review and information gathered from Productivity SA. This data covered studies already conducted with regard to manufacturing SMEs.

3.7.2 Primary data

As is described by (Cooper & Schindler, (2006:717), primary data is data the researcher collects to address the specific problem at hand. Primary data will be collected through a questionnaire. This questionnaire will be developed and distributed to manufacturing SME owners or managers. A five-point scale was used to gather data through the questionnaire. The questionnaire used involved simple and concise language, easy layout

and clear instructions. (See attached **Appendix 1** for the letter and research questionnaire at the end of the research report).

3.8 Reliability and validity of the study

This section provides a discussion of reliability and validity of the study.

3.8.1 Reliability

As is defined by Hair, et al. (2010:2), reliability is "the extent to which a variable or set of variables is consistent in what it is intended to measure." Based on the reliability, the study under research methodology, tests, and in terms of the reliability of the data, aimed at showing whether the research relied on the survey used in order to provide the same values when the survey was administered repeatedly under similar conditions with regard to efficiency on how it influence the productivity of manufacturing SMEs in the West of Industria.

3.8.2 Validity

Validity in Hair, et al. (2010:2) refers to "the extent to which a measure or set of measures correctly represent the concept of study – a degree to which it is free from any systematic or non-random error." According to Leedy and Omrod (2010:97-99), there are two types of validity, namely internal validity and external validity. Internal validity involves the extent to which its design and the data it yields allows the researcher to draw accurate conclusions about cause-and-effect and other relationships within the data. On the contrary, external validity focuses on the extent to which results apply to situations beyond the study itself; the extent to which the conclusion drawn can be generalised in other contexts. Based on validity, Leedy and Omrod (2010:97), the research firstly investigated whether the study has sufficient control to ensure that the conclusion drawn was truly warranted by the data. Secondly, the researcher further investigated whether what was observed by the researcher in the research situation made generalisations about the world beyond that specific situation.

3.9 Data analysis

As is explained by Cooper and Schindler (2011:717), data analysis involved reducing accumulated data to a manageable size, developing summaries, looking for patterns, and

applying statistical techniques. Statistical Package for the Social Sciences (SPSS) was used as computer software in order to describe and analyse sets of quantitative data. Data was edited and captured for processing and descriptive measures were provided to describe data according to its structure. Data was be summarised for individual variables in the form of frequency tables. Leedy and Omrod (2010:30-1) point out that descriptive statistics summarise the general nature of data obtained. For instance, how certain measured characteristics appear to be "on average", how much variability exists among different pieces of data, or how closely two or more characteristics are interrelated. Inferential statistics were done by assisting the research to make decisions about the data based on the descriptive statistics (Leedy & Omrod, 2010:31). Cronbach's alpha was used to measure the construct and alpha coefficient was also applied describe the reliability of factors extracted from dichotomous and/or multi-point formatted questionnaires or scales (i.e., rating scale: 1 = strongly disagree, 5 = strongly agree).

3.10 Delimitation of the study

There are various types of SMEs used in the country as is indicated by the National Small Business Act 26 of 2003, Republic of South Africa: 2003. The study focused only on manufacturing SMEs in the West of Industria around the Gauteng region.

3.11 Ethical Consideration

The purpose of ethics is to ensure that that no-one is harmed or suffers adverse consequences from research activities conducted in manufacturing SMEs in the West of Industria around the Gauteng region. The researcher should follow guides, namely explaining the study benefits, explaining the respondent's rights and protection as well as obtaining informed consent (Cooper & Schindler, 2011:718). According to Quinlan (2011:480), ethics involves norms or standards of behaviour that guide moral choices about our behaviour and our relationships with others.

According to Cooper and Schindler (2006:118), when making direct contact with the participant, the researcher should discuss the study's benefits and should be careful not to overstate or understate the benefits. Findings from the literature further indicate that the purpose and benefits of one's study or experiment must be concealed from the participants to avoid introducing biases, which could lead to deception. Deception means

when the participants are not told the truth or when the truth is fully compromised. Deception may not be applicable as it may be used to attempt to improve the response rate. For example, the purpose of the study was explained to the manufacturing SME's participants. They were advised of the credentials of the person conducting the study, why the study was being conducted and the benefits of the research to manufacturing SMEs' participants. All respondents were given a follow-up letter in which business owners were assured of the privacy and confidentiality of the information they provided as well as guaranteeing their anonymity (Cooper & Schindler, 2006:118).

5. LAYOUT OF THE CHAPTERS

The chapter outline of the research project is presented below as follows:

1. Introduction
2. Literature review
3. Research methodology
4. Results and discussions
5. Conclusions
6. Recommendations

6. THE WORK PLAN

The work plan the research project is presented below:

CHAPTERS	TOPICS	DATES
Chapter 1	Introduction	January – February 2013
Chapter 2	Literature review	February – July 2013
Chapter 3	Research methodology	July – October 2013
Chapter 4	Findings and discussions	Mid October 2013 – Mid January 2014
Chapter 5	Conclusions	Mid January – End January 2014
Chapter 6	Recommendations	End January – Third week of February 2014

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

The primary objective was to investigate productivity and its influence on manufacturing SMEs in the Gauteng region. The following research questions were addressed:

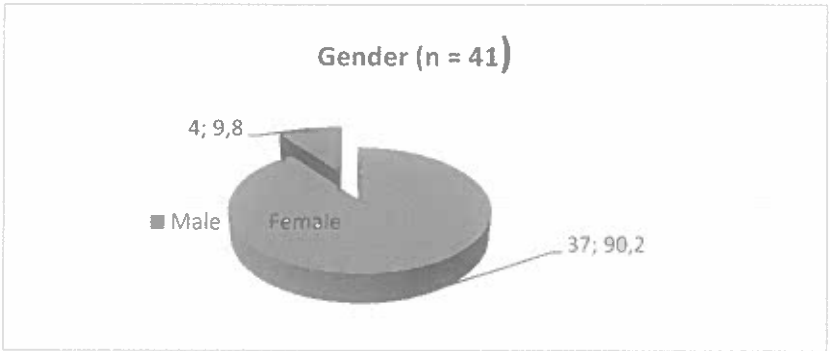
- Do manufacturing SMEs measure productivity in their businesses in the Gauteng region?
- What are the factors influencing productivity of manufacturing SMEs in the Gauteng region?
- Do manufacturing SMEs adopt efficiency in improving the productivity of their businesses in the Gauteng region?

Statistical Package for the Social Sciences (SPSS) was used as computer software in order to describe and analyse sets of quantitative data. Data was edited and captured for processing and provision of descriptive measures with the aim of describing data according to its structure. Data was summarised for individual variables in the form of frequency tables and/or graphs. As stipulated in the objectives, this study was descriptive in nature. Therefore only frequency has been provided; no statistical test of significance has been carried out.

4.2 Demographic information

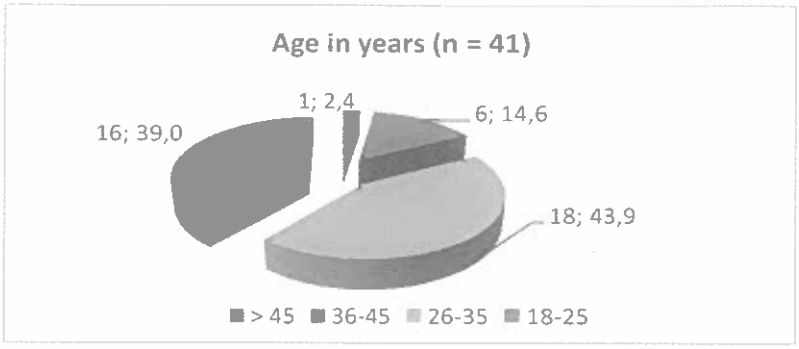
The information with regard to gender of participant is provided as **Figure 1** below. Most of the participants provided with questionnaires amongst the manufacturing SMEs in the West of Industria (Gauteng region), were males. The results showed that 90.2% of the participants taking part in this study were males.

Figure 1: Frequency of gender of participants



Based on the results, the study in **Figure 2** indicates the frequency of age of participants below. The majority are between the ages of 26 and 35 years at 43.9%, followed by participants between the ages of 18 and 25 years at 39%.

Figure 2: Frequency of the age groups of participants



In terms of the results provided in Figure 3, the observation has been made and the majority of manufacturing SME participants was 61%, with more than 10 years' experience and 22% between 5 and 10 years' experience.

Figure 3: Frequency of the number of years of experience

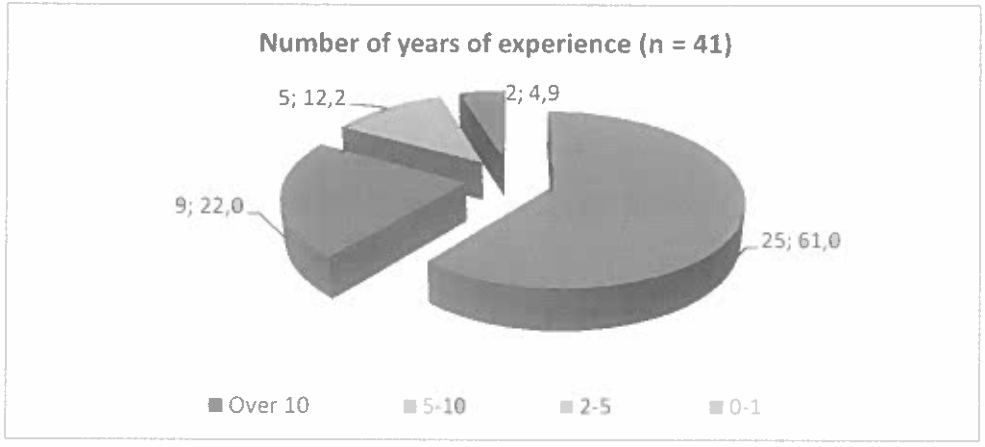
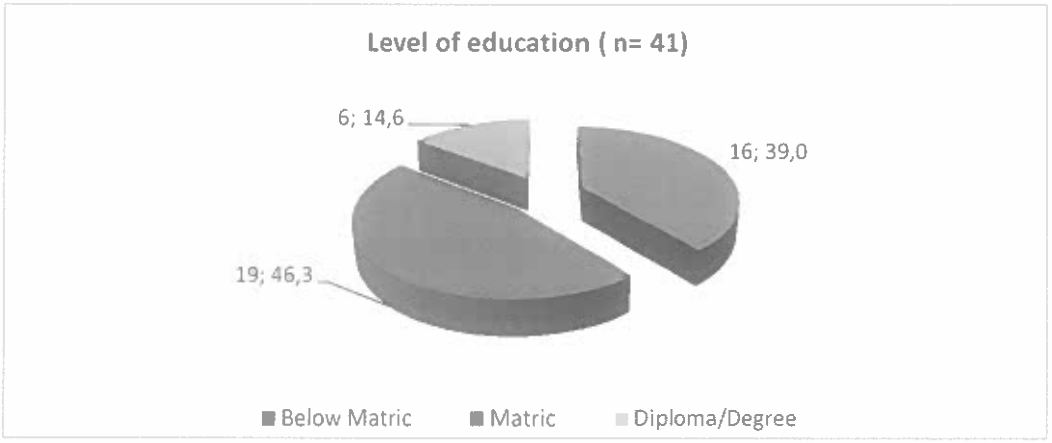


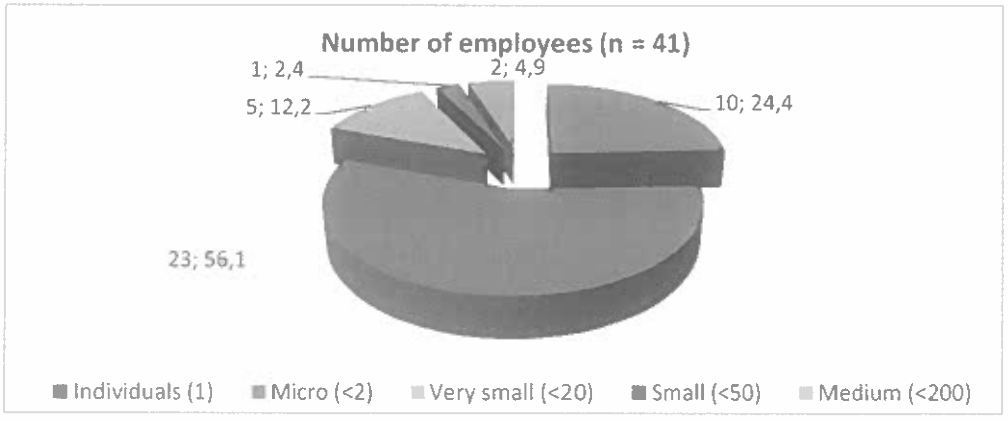
Figure 4 indicates that 46.3% of manufacturing SME owners has a high level of education, which is matric. The balance of manufacturing SME owners participating in the survey as indicated in the graph has other qualifications and high school education less than matric.

Figure 4 Frequency of the highest level of education of participants



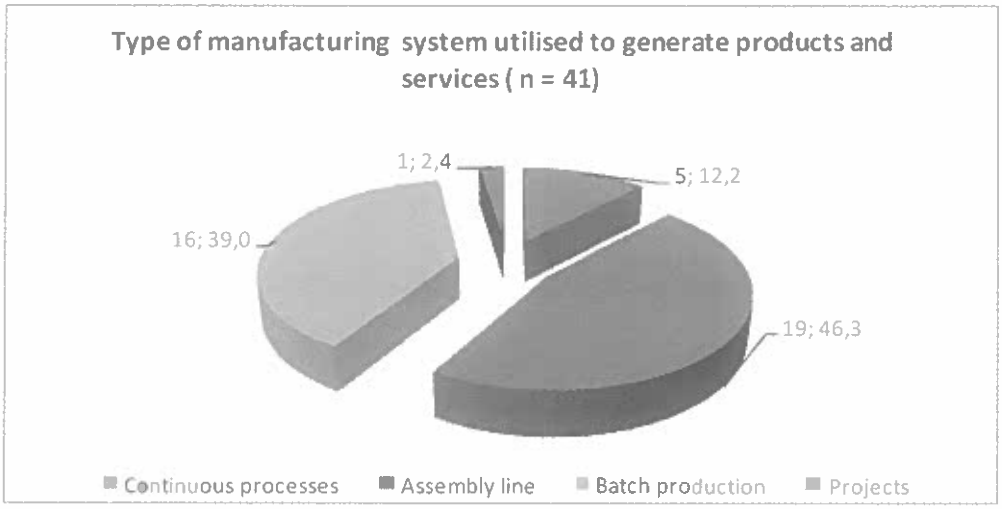
All companies taking part in the study are from the manufacturing sector. Based on the results, the study in Figure 5 indicates that the frequency of number of employees in manufacturing SMEs (56.1%) is higher than the balance of manufacturing SME clusters including micro enterprises.

Figure 5: Frequency of the number of employees in companies



In terms of the results provided in **Figure 6,** this shows the frequency of the most popular type of manufacturing system utilised to generate products and services which was assembly with 46.3% followed by batch production with 39%.

Figure 6 Frequency of systems used to generate products and services

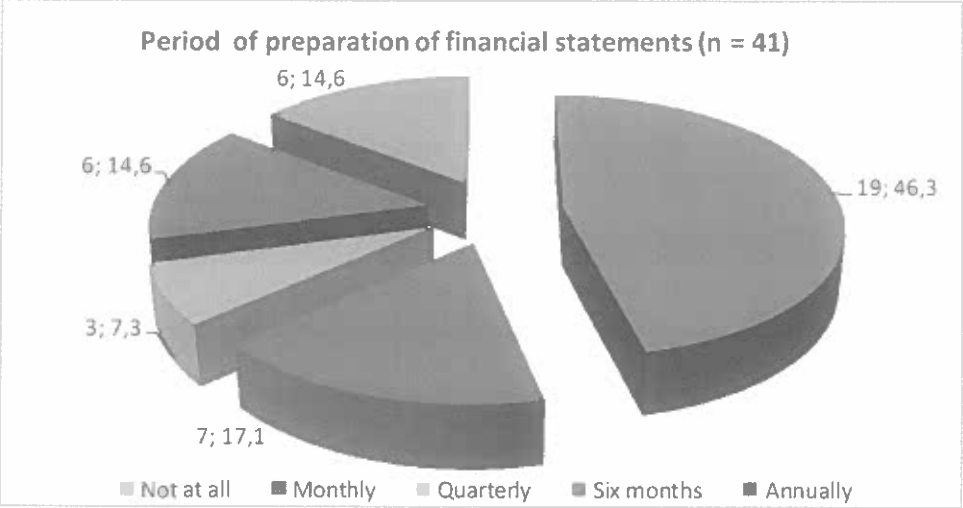


The frequency of the level of qualification of employees in operation management is addressed on the pie chart as **Figure 7** below. **Figure 7** indicates that most employees do not have an educational background in operations management. The frequency of the level of qualification of employees in operation management is none which is 95.1%.

Figure 7: Frequency of level of qualification of employees in operation Management

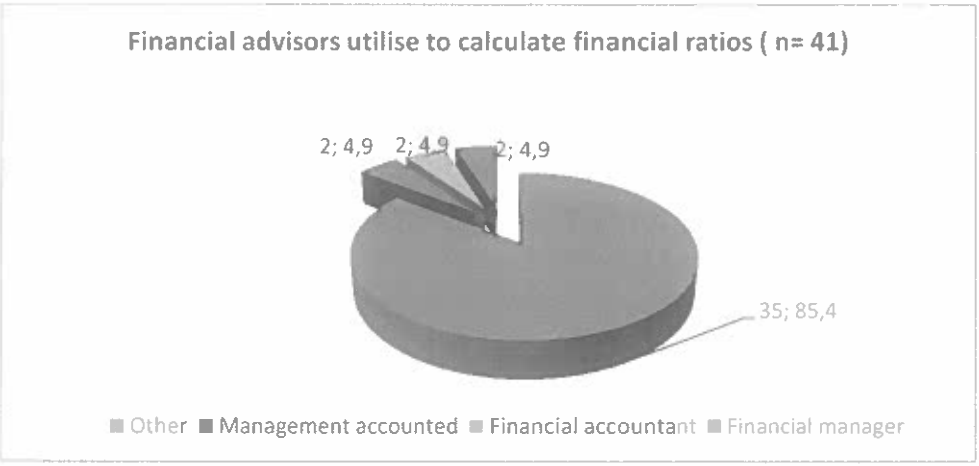
Based on the results provided, **Figure 8** shows that the frequency of manufacturing SMEs that do not prepare financial statements is 46.3%.This is critical to manufacturing SMEs.

Figure 8: Frequency of period of preparation of financial statements



The frequency of financial advisors to utilise and calculate financial ratios is addressed in the pie chart as **Figure 9** below. **Figure 9** indicates that most of the people used to calculate financial ratios are bookkeepers or this task is carried out by the SME owner. The frequency of bookkeepers and SME owners who do not utilise and calculate financial ratios is 85.4%.

Figure 9: Frequency of financial advisors utilise to calculate financial Ratios



4.3 Reliability analysis

It is important to know that the instrument used to assess a concept will always elicit consistent and reliable responses even if questions are replaced with other similar questions. When a variable is generated from a set of questions that returns a stable response, the variable is said to be reliable.

Cronbach's alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct." Construct is the hypothetical variable that is being measured (Hatcher, 1994).

Alpha coefficient ranges in value from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous (that is, questions with two possible answers) and/or multi-point formatted questionnaires or scales (i.e., rating scale: 1 = strongly disagree, 5 = strongly agree). The higher the score, the more reliable the generated scale. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature.

Table 1 Reliability analysis of the questionnaire

Section	Number of variables	Cranbach' s Alpha
B	12	0.93
C: Labour	6	0.77
C: Physical Capital	6	0.50
C: Financial Capital	2	0.12
C: Management	6	0.71

From **Table 1**, we can see that Section B: labour, and Section C: management, are reliable as their Cronbach' Alpha coefficients are more than 0.70. Physical capital, Section C such as physical capital is also acceptable with a coefficient of 0.50. The reliability of financial capital is unacceptable. These questions assess financial capital separately.

4.4 Frequency distributions of productivity of manufacturing SMEs

Table 2: Frequency of Efficiency practices relating to productivity improvement

Variables	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total	Mean/ Average
Productivity improvement is part of the goals	19	11	1	2	8	41	3.76
Key areas of productivity improvement have been applied	19	5	1	5	11	41	3.39
Measure of products produced against material used	19	6	0	4	12	41	3.39
Measure of products produced against machinery used	13	2	3	5	18	41	2.68
Measure of products produced against labour used	12	3	1	6	19	41	2.59
Measure of products produced in terms of value against material used	18	5	2	11	5	41	3.34
Measure of products produced in terms of value against machinery used	16	7	0	6	12	41	3.22
Measure products produced in terms of value against labour used	17	6	0	5	13	41	3.22
Measure all products produced in terms of total value against all resources	18	6	0	4	13	41	3.29
Employees are working in a healthy environment	15	7	2	5	12	41	3.20
Company operational performance is measured against the set standards	19	4	2	6	10	41	3.39
Company operational performance is measured currently against the previous period	14	11	1	6	9	41	3.37

Table 2 indicates that the mean or average score appears to be favourable in terms of productivity improvement as part of the goals used in the 5-point likert scale. The mean score is 3.76, which is acceptable since it is closer to 4. This means most of manufacturing SMEs owners agreed with productivity improvement as part of their goals. This indicates that efficiency can positively influence most manufacturing SMEs, encouraging them to grow in productivity. The rest of the variable in Table 2: shows the participants of manufacturing to be neutral, which neither agrees nor disagrees.

Table 3: Frequency of key productivity measures in terms of labour

Variables	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total	Mean/ Average
Employees are provided with OM training	13	6	0	4	18	41	2.80
There is a budget allocated for employee training	4	4	0	3	30	41	1.76
Employees are empowered to take the lead on productivity improvement initiatives	12	3	2	6	18	41	2.63
Employees exercise set standards to carry out operational activities	16	11	3	5	6	41	3.63
Employees' experience contribute to the improvement of productivity	21	10	1	3	6	41	3.90
Employees' age contribute to the improvement of productivity	22	4	2	2	11	41	3.59

Table 3 above addresses the frequency of key productivity measures in terms of labour. This **Table** indicates that the mean or average score appears to be unfavourable in terms of employees being provided with operations management (OM) training with the mean score of 2.80 and a budget allocated for employee training with the mean score of 1.76. This matter shows a concern to the manufacturing SMEs owners or managers realise that training in the relevant job; and budget for employees training is critical to the efficient operation of manufacturing SMEs in order to improve the productivity of their businesses. The rest of the variables indicated in **Table 3** appear to be at mean score of approximately 3, which means the mean scores are neutral with answer to the research questionnaire.

Table 4: Frequency key productivity measures in terms of physical capital

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total	Mean/Average
Company invests in new machine/technology	16	5	1	4	15	41	3.07
Company maintain machinery and equipment	28	4	1	2	6	41	4.12
Company uses material without	15	11	1	11	3	41	3.59

waste							
Company comply with set standards	18	14	1	5	3	41	3.95
Company produces products on time	30	7	0	4	0	41	4.54
Company produces products without any defects	23	11	0	5	2	41	4.17

Table 4 above presents frequency key productivity measures in terms of physical capital.

This Table indicates that the mean or average score appears to be neutral in terms of whether manufacturing SMEs invest in new machinery/technology. The answer appeared to be difficult to answer as these SMEs use both new and old machinery.

Secondly the rest of the variables in terms of physical capital in **Table 4** above appear to be favourable since most of the respondents in their manufacturing SMEs agreed that they maintain the machinery and equipment; comply with set standards; use material without waste; produce products without any defects and on time. The mean score of all these variables for manufacturing SMEs is approximately 4.

Table 5: Frequency key productivity measures in terms of financial capital

Variables	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total	Mean/ Average
Company always keep record for progress purposes	14	10	1	4	12	41	3.24
Company have access to finance by government	0	0	1	3	37	41	1.12

Table 5 above poses frequency key productivity measures in terms of financial capital.

This **table** indicates that the mean or average score appears to be neutral in terms of the first variable which is whether manufacturing SMEs always keep records for progress purposes. The mean score is 3.24. The second variable appears to be unfavourable for manufacturing SMEs since these SMEs are not provided with finance to grow their businesses financially. The mean score is 1.12.

Table 6: Frequency key productivity measures in terms of management

Variables	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total	Mean/ Average
Planning forms part of goals	21	13	2	0	5	41	4.10
Manager delegates operational activities	24	15	0	1	1	41	4.46

Control forms part of goals	27	7	2	4	1	41	4.34
Utilisation of new techniques and skills for productivity growth	16	5	4	7	9	41	3.29
Employees are provided with incentives	21	9	4	1	6	41	3.93
Utilisation of entrepreneurial skills for productivity growth	13	0	4	0	24	41	2.46

Table 6 above poses frequency key productivity measures in terms of management. **Table 6** indicates that planning; delegating; controlling and provision of incentives to employees play a vital role amongst manufacturing SMEs. The mean score is approximately 4. Based on the use of new techniques and skills for productivity growth amongst manufacturing SMEs, the mean score appears to be neutral, that is 3. The last variable, entrepreneurial skills, with a mean score of approximately 2, appears to be unfavourable for these manufacturing SMEs to grow in their businesses which negatively contribute to the productivity of these SMEs.

CHAPTER 5: CONCLUSION

5.1 Introduction

The purpose of this chapter is to summarise and draw conclusions regarding the main findings of this study with regard to manufacturing SMEs in the West of Industria, Gauteng region.

5.2 Conclusion

In this section, the frequency distributions of productivity of manufacturing SMEs; frequency of key productivity measures in terms of labour; frequency key productivity measures in terms of physical capital; frequency key productivity measures in terms of financial capital and frequency key productivity measures in terms of management are commented on.

5.2.1 Frequency distributions of productivity of manufacturing SMEs

Most manufacturing SMEs agreed that they regard productivity improvement as part of their business goals. It appears from the results that SMEs, by recognising productivity improvement as part of their goals, show higher levels of efficiency that positively influences the productivity of their businesses. In terms of those SMEs owners who had a neutral response, it appears from the results that they lack information regarding productivity improvement.

5.2.2 Frequency of key productivity measures in terms of labour

In terms of labour, training plays an important role in encouraging employees to improve the productivity of manufacturing SMEs. It appears that manufacturing SMEs do not provide employees with training. This is due to lack of knowledge and educational background in operations management. Most manufacturing SMEs owners have matric but no formal tertiary qualification in operations management. The research came to the conclusion that respondents amongst manufacturing SMEs are unable to pass on additional knowledge to employees who might have the same qualification as them. Based on the conclusion, if manufacturing SMEs owners do not have additional skills, it is difficult for them to motivate employees to increase their skill levels with the aim of improving productivity in their businesses.

5.2.3 Frequency of key productivity measures in terms of physical capital

New machinery and technology present problems to manufacturing SMEs. Firstly, manufacturing SMEs lack access to finances due to the governance of financial institutions. Secondly, manufacturing SMEs prefer to make use of older machinery as technologically, they are easier to maintain.

To the contrary, most of the respondents in manufacturing SMEs agreed that they maintain the machinery and equipment; comply with set standards; use material without waste; and produce products without any defects on time. Based on the results, it appears to the results that these manufacturing SMEs realise the importance of focussing on the variables listed above as they contribute to overall efficiency, which impacts positively on the productivity of their businesses.

5.2.4 Frequency of key productivity measures in terms of financial capital

The results show that record keeping amongst manufacturing SME's is neutral. A lack of record keeping about the financial background of a business makes it difficult for financial institutions or government to provide these businesses with funds due to lack of trust. Secondly, in terms of lack of access to finance by manufacturing SMEs, financial institution do not provide these businesses with finance due to trust in terms of getting their money back. Other reasons for lack of availability of finances include business location and lack of knowledge of business regulations. Based on the results, the research concludes that manufacturing SMEs need training of record keeping in order for them to be committed in keeping records for their businesses.

5.2.5 Frequency of key productivity measures in terms of management

Most of the respondents in manufacturing SMEs agreed that planning; delegating; controlling and provision of incentives to employees, play a vital role amongst manufacturing SMEs. Based on the literature, manufacturing SMEs will be efficient in their operations and this will positively contribute to the productivity of their businesses, if they set goals for the company; delegate employees towards their work activities; monitor employees performance and motivate employees. So, based on the result, it appears that these SMEs owners have been exposed to management functions on how to be engaged in their effort using management functions to achieve the results of their businesses.

Secondly, new techniques and skills for productivity growth amongst manufacturing SMEs appears to be neutral. Based on the results, the research came to the conclusion that manufacturing SMEs lack information on new technology for manufacturing SMEs.

CHAPTER 6: RECOMMENDATIONS

6.1 Introduction

Based on the literature review and the results of the study, recommendations are made in terms of frequency distributions of productivity of manufacturing SMEs; frequency of key productivity measures in terms of labour; frequency key productivity measures in terms of physical capital; frequency key productivity measures in terms of financial capital and frequency key productivity measures in terms of management.

6.2 Recommendations

6.2.1 Frequency distributions of productivity of manufacturing SMEs

It is suggested that by identifying productivity improvement as part of their business goals, manufacturing SMEs will operate more efficiently in their businesses. This efficiency will positively contribute to the productivity of their businesses.

6.2.2 Frequency of key productivity measures in terms of labour

In terms of labour, it is recommended that training is would be beneficial employees as well as manufacturing SMEs owners or managers. This will encourage them to be involved in contributing to the efficiency of operational activities which will contribute to the productivity of manufacturing SMEs in businesses. Furthermore, since matric and experience are gateways to attendance at tertiary institutions, those owners, managers and employees who have matric, can use this as an opportunity to apply and register for a relevant degree or national diploma which will add value in their manufacturing businesses and improve the productivity of the business (International Labour Organisation, 2008:1).

6.2.3 Frequency of key productivity measures in terms of physical capital

Since manufacturing SMEs are faced with global completion, it is recommended that these SMEs to take new machinery and technology into account. New machinery and technology will accelerate their business and increase productivity leading towards offering a competitive edge.

By realising the importance of maintaining machinery and equipment; complying with set standards; using material without waste; producing products without defects, on time, it is recommended that manufacturing SMEs adhere to the same principles. Consistency will increase the level of business efficiency which improves the level of productivity.

6.2.4 Frequency of key productivity measures in terms of financial capital

The results show the reliability of financial capital is unacceptable. If these results were neutral, it is suggested that if manufacturing SMEs were to keep financial records, they would be in a position to ascertain their financial progress. By doing this, it be easier for manufacturing SMEs to see where they are going wrong and rectify the matter immediately. Keeping financial records contributes indirectly to the productivity of manufacturing SMEs. These records will assist manufacturing SMEs to grow their businesses in terms of profitability. By keeping financial records, manufacturing SME's will gain the trust of financial institutions since they will be able to show evidence in terms of their financial backgrounds.

6.2.5 Frequency of key productivity measures in terms of management

It is suggested that by considering planning; delegating; controlling and provision of incentives to employees as a vital role amongst manufacturing SMEs, employees will be committed to the work activities of the businesses where they belong and manufacturing SMEs will operate efficiently in their businesses. As a result, efficiency will positively contribute to the productivity of their businesses. It is also recommended that new techniques and skills improve operational activities of manufacturing SMEs which accelerates efficiency leading to an improvement in productivity of manufacturing SMEs.

6.3 FINAL CONCLUSION

Although the study was exploratory and quantitative in nature, and could not be generalised to other businesses (such as small businesses and medium enterprises amongst manufacturing SMEs) it identified how efficiency plays a vital role in the improvement of productivity amongst manufacturing SMEs. Guidelines to promote successful business enterprises were also developed in the form of recommendations made. The shortcoming of the study was that the study focussed more on micro, very small and small businesses rather than medium enterprises.

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UNISA university of south africa

Letter of Questionnaire

Dear Respondent

I would like you to fill this research questionnaire for **15 to 20 minutes** for me not to take more of your time as you are busy with your managerial work activities. The research project is conducted for the purpose of completing my **Masters in Business Leadership** at the University of South Africa (UNISA). My study focuses on **"An investigation into the productivity of Manufacturing SMEs in the Gauteng Region."**

Your participation will be greatly appreciated in this project by completing the attached research questionnaire and agree to a follow-up interview to investigate at any issues in more depth related to my topic.

All information obtained from this questionnaire will be treated as **confidential** and participants' identity will remain **anonymous**. The results of this project will be used for academic purposes only, and might be used for the academic publication.

The questionnaire seeks information about the execution of certain selected efficiency practices in your company. The selected practices to be considered are related to the following: productivity improvement techniques used; productivity measures; productivity measures in terms of labour, capital and management; factors influencing the productivity of manufacturing SMEs; and the influence of efficiency on the productivity of manufacturing SMEs. You will be asked to consider how these various elements are managed in your company.

The respondent will be kindly asked to answer each question as objective as possible, not forgetting that biases sometimes confuses the real answer. Please tick the box to indicate an answer, which in your judgment accurately portray the present situation in the company. Your responses should reflect your situation in your section/ company. The reliability and validity of this research largely depends on the accuracy of your answers.

Thanking you in advance for your participation in the completion of this questionnaire. For further information the details of my Research Supervisor are as follows:
Prof. Douglas Boateng: Cell number: 0823352688

We are hoping for a favorable response.

Yours Sincerely

Boysana Mbonyane: Researcher: MBL Student
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QUESTIONNAIRE

AN INVESTIGATION INTO THE PRODUCTIVITY OF MANUFACTURING SMALL AND MEDIUM ENTERPRISES IN THE GAUTING REGION IN SOUTH AFRICA

Please answer the questions below as truthfully as you can as they relate to your business. Mark with an "X" the box that best corresponds to your answer. There is no right or wrong answer.

For office use only

SECTION A: DEMOGRAPHICS

1. What your gender?

Male	
Female	

V1 [ ] 2

2. What is your age as the owner/ manager in your company?

18 - 25 years	
26-35 years	
36 -45 years	
46- 55 years	

V2 [ ] 3

3. Number of years of experience of your company?

0 - 1 years	
2 - 5 years	
5 -10 years	
Over 10 years	

V3 [ ] 4

4. What is your highest level of education?

Below matric	
Matric	
Diploma/ Degree	
Post graduate	

V4 [ ] 5

5. To which type of manufacturing business do your company belong in the business?

Manufacturing	
Service	
Retailing	
Other	

V5 [ ] 6

6. How many employees are in your company?

Medium	< 200
Small	< 50
Very small	< 20
Micro	< 5
Indivduals	1

V6 [ ] 7

7. What type of manufacturing system does your company utilise to generate products and services?

Projects	
Job Shops	
Batch Production	
Assembly Line	
Continuous Processes	
Other	

V7 [ ] 8

8. At what level do your employees have operations management (OM) Qualification?

OM Post Graduate Degree	
OM Advanced Diploma/ Degree	
OM National Diploma	
OM Certificate	
None	

V8 [ ] 9

9. At what period does your company prepare financial statements

Annually	
Six months	
Quartely	
Monthly	
Not at all	

V9 [ ] 10

10. Which type of financial advisors does your company utilise to calculate financial ratios?

Chief financial officer	
Finanancial Manager	
Financial accountant	
Management accountent	
Other	

V10 [ ] 11

SECTION B: INVESTIGATION INTO THE PRODUCTIVITY OF YOUR COMPANY.
PART ONE: EFFICIENCY PRACTICES RELATING TO PRODUCTIVITY IMPROVEMENT IN YOUR COMPANY.

Scale:

5.Strongly Agree	4. Agree	3. Neither agree nor disagree	2. Disagree	1. strongly disagree

Tick X in the box of your choice

11. Productivity improvement is part of your Company goals

5	4	3	2	1

V11 [ ] 12

12. Key areas of productivity improvement in your a section/ department/ unit have been applied

5	4	3	2	1

V12 [ ] 13

13. Your company measures products produced (output) against material (in material units) used (input).

5	4	3	2	1

V13 [ ] 14

14. Your company measures products produced (output) against machinery (in machine hours) used (input).

5	4	3	2	1

V14 [ ] 15

15. Your company measures products produced (output) against labour (in labour hours) used (input).

5	4	3	2	1

V15 [ ] 16

16. Your company measures products produced (output) in terms of value against of material used (input) in terms cost.

5	4	3	2	1

V16 [ ] 17

17. Your company measures products produced (output) in terms of value against of machinery used (input) in terms cost

5	4	3	2	1

V17 [ ] 18

18. Your company measures products produced (output) in terms of value against of labour used (input) in terms cost

5	4	3	2	1

V18 [ ] 19

19. Your company measures all products produced (output) in terms of total value against of all resources (material, machinery, labour, energy, etc.) used (input) in terms cost

5	4	3	2	1

V19 [ ] 20

20. As a Manager/ company owner you ensure that employees are working in a healthy environment in your company

5	4	3	2	1

V20 [ ] 21

21. Your company operational performance is measured against the set standards

5	4	3	2	1

V21 [ ] 22

22. Your company company operational performance is measured currently against the the previous period

5	4	3	2	1

V22 [ ] 23

SECTION C: YOUR COMPANY KEY PRODUCTIVITY MEASURES IN TERMS OF LABOUR; CAPITAL AND MANAGEMENT IN YOUR COMPANY.

LABOUR

Scale:

5.Strongly Agree	**4. Agree**	**3. Neither agree nor disagree**	**2. Disagree**	**1. strongly disagree**

Tick X in the box of your choice

23. Employees are provided with Operations Management (OM) training in your company

5	4	3	2	1

V23 [ ] 24

24. There is a budget allocated by your company for employee training

5	4	3	2	1

V24 [ ] 25

25. Employees are empowered to take the lead on the productivity improvement initiatives.

5	4	3	2	1

V25 [ ] 26

26. Employees exercise set standards to carry out their operational activities.

5	4	3	2	1

V26 [ ] 27

27. Employees' experience contribute to the improvement of productivity into your company.

5	4	3	2	1

V27 [ ] 28

28. Employees' age contribute to the improvement of productivity into your company.

5	4	3	2	1

V28 [ ] 29

CAPITAL

1) Physical Capital

Scale:

5.Strongly Agree	**4. Agree**	**3. Neither agree nor disagree**	**2. Disagree**	**1. strongly disagree**

Tick X in the box of your choice

29. Your company invests in new machine/ technology

5	4	3	2	1

V29 [ ] 30

30. Your company maintain machinery and equipment

5	4	3	2	1

V30 [ ] 31

31. Your company uses material without any waste.

5	4	3	2	1

V31 [ ] 32

32. Your company comply with set standards

5	4	3	2	1

V32 [ ] 33

33. Your company produces products on time.

5	4	3	2	1

V33 [ ] 34

34. Your company produce products without any defects.

5	4	3	2	1

V34 [ ] 35

2) Financial Capital

35. Your company always keep record for progress purposes

5	4	3	2	1

V35 [ ] 36

36. Your company have access to finance by the government/ financial institutions

5	4	3	2	1

V36 [ ] 37

MANAGEMENT

37. As a manager/ owner planning forms part of your company goals in your company.

5	4	3	2	1

V37 [ ] 38

38. As a manager/ owner you delegate operational activities to respective employees

5	4	3	2	1

V38 [ ] 39

39. As a manager/ owner control forms part of your company goals in your company.

5	4	3	2	1

V39 [ ] 40

40. As a manager/ owner you utilise new techniques skills for productivity growth in the manufacturing in your company

5	4	3	2	1

V40 [ ] 41

41. As a Manager/ company owner you ensure that employees are provided with incentives in your company.

5	4	3	2	1

V41 [ ] 42

42. As a manager/ owner you utilise entrepreneurial skills for productivity growth in your company.

5	4	3	2	1

V42 [ ] 43

THANK YOU VERY MUCH FOR YOUR VALUABLE TIME