DEVELOPING A HUMAN CAPITAL SCORECARD FOR LEAN IMPLEMENTATION WITHIN AN ENGINEERING ENVIRONMENT– THE CASE OF TRANSNET COACH BUSINESS UNIT

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ABSTRACT

Lean manufacturing is a very good and effective concept of managing a company. The philosophy of reducing wastes found in a manufacturing business is a sound idea. When these wastes are minimized, the quality of the products or services is improved, the production time and the cost of manufacturing the goods is reduced. With this in mind, many companies go through lean manufacturing training to get the most out of their systems.

But this is only achieved if there is a proper implementation lean manufacturing plan. However, despite the training and plans, some companies have trouble in implementing lean manufacturing systems. There are different reasons in the failure of implementing lean manufacturing principles in projects. One of them is the difficulty in grasping the true nature of lean manufacturing from a human capital perspective.

The research, through a comprehensive literature review, investigated and identified the human capital factors that were important for the successful implementation of Lean in an engineering environment. The human capital factors identified were as follows:

- Training
- Roles & Responsibilities
- Job Multi-skilling
- Job Empowerment
- Communication
- Respect for Humanity

The above factors were then used to construct a survey questionnaire and using Transnet Rail Engineering Coach Business as a case study, the survey was distributed to each of the four businesses to ascertain the importance of these factors in their implementation. The results of the analysis strongly indicated that all six of these human capital factors were found to be viewed

as important for a successful Lean implementation from the perspective of the participants.

Incorporating these factors into a human capital scorecard would thus enable an engineering business to successfully manage the implementation of Lean in their engineering environment.

ACKNOWLEDGEMENTS

Firstly, I would like to express my deepest gratitude and appreciation to my mentor Dr Douglas Boateng, from the University of South Africa (UNISA): SBL for his input and guidance through the duration of this entire research paper. His guidance enabled me to mould my thoughts and ideas in a clear and cohesive manner.

I would like to extend a very gracious thanks to all Transnet Rail Engineering Coach Business managers and supervisors who participated and completed the questionnaire surveys to make possible the successful completion of this research.

Finally, I would like to thank my wife, Madhu Moopanar who has been my pillar of strength and support during this study. To my family, friends, colleagues and everyone else who has lived this experience with me. This report would not have been possible without their input, emotional support and sacrifice. And thanks to God with whom all things are possible.

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DECLARATION

The researcher certifies and declares that, other than where elsewhere noted, the entire body of this research is the researcher's own work, and that all references used have been accurately reported. The research is being submitted in partial fulfilment of the requirements for the degree of Master of Business Leadership at the Graduate School of Business Leadership, UNISA and has not been submitted before, in whole or in part, for any degree or examination at any university.

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Signed: Collin Moopanar

Date: 01 December 2009

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1. ORIENTATION

1.1 Introduction

Lean management is “a systematic approach to identifying and eliminating waste through continuous improvement by flowing the product at the demand of the customer” (www.leanmanufacturingguide.com). The process of lean manufacturing is not just a matter of the type of machinery a plant has, instead it is highly dependent on the personnel of the company. When it comes to lean management systems no one piece or person is more important than the other, as they all have an important role to play. Everyone is part of the lean management system, no matter what department they may work in. In this type of environment people feel appreciated and are motivated to contribute even more. There is no other way to create this sense of family and loyalty. The goal of lean manufacturing is achieved through the human resources of the company using best practices coupled with the right machinery and best practices as tools to meet the set goals. A big advantage for workers in a lean environment is that they are a major part of the company’s decision-making process. In order to improve operations and prevent waste, employees are actively encouraged to make suggestions and take actions. This level of employee involvement helps to improve morale and employee performance as a result of them being empowered to make decisions thereby ensuring their commitment and involvement. These are essential contributors in terms of many of the functions of lean management.

Lean organisations have a more organic structure, where each worker is a leader in their own area of expertise and not hierarchical structure. In this type of environment people feel appreciated and are motivated to contribute. The higher levels of motivation outlined by Maslow are directly addressed in many of the lean techniques including team building, work cells and Kaizen. Some of the key motivating factors that are addressed by these processes include self-actualization, self-esteem and affiliation.

In line with the 5 year turn around strategy undertaken by Transnet, specifically the Transnet Rail Engineering (TRE) division has embarked on a strategy of its own to improve productivity by improving throughput through process improvement and waste reduction in all of its processes within the different business units. This strategy focused on the implementation of Lean Management throughout all the business units within the division. Prior to the implementation of the strategy, visits to General Electric in the USA was undertaken to understand the process and benefits of such implementation and to benchmark against a division of a company operating in a first world country.

The South African passenger coach production industry is highly competitive with several domestic rivals competing for a percentage of a limited market share. The industry is faced with a fair share of difficulties as illustrated in Table 1 both through political, technological and globalisation perspectives. Despite these imminent difficulties, the market has a huge growth potential due to the influx of a huge contingent of soccer fans as a result of the imminent start of the 2010 world cup. This combined with the governments mandate to provide the mass population with affordable, reliable and safe transportation provides the market with opportunities to capitalise on.

Table 1: Significant Pressures in SA's Competitive Landscape

Significant Pressures in SA's Competitive Landscape	
Changes in Legislation	Privatisation
Globalisation	Pressure Groups
Parallel Importation	Black Economic Empowerment
Technology	
Alliances and Production Sharing	

Many companies in South Africa are faced with the reality of increased competition through globalisation and through the development of black empowerment companies that are funded through government initiatives. The Coach business unit within Transnet Rail Engineering is no exception to this

as it is the only business unit at this stage that is faced with the threat of rivals and has to formulate strategies to protect and grow its market share.

The Coach business is made up of four operational units located in different provinces within South Africa as shown in Figure 1. Each business unit is under the control of a business manager reporting to the National Operations manager who eventually reports to the GM: Coach Business.

Figure 1: Organogram of TRE Coach Business Senior Management Structure

The structure and staff complement for each of the centers, as illustrated in Figure 2, is made up of a diverse labour workforce.

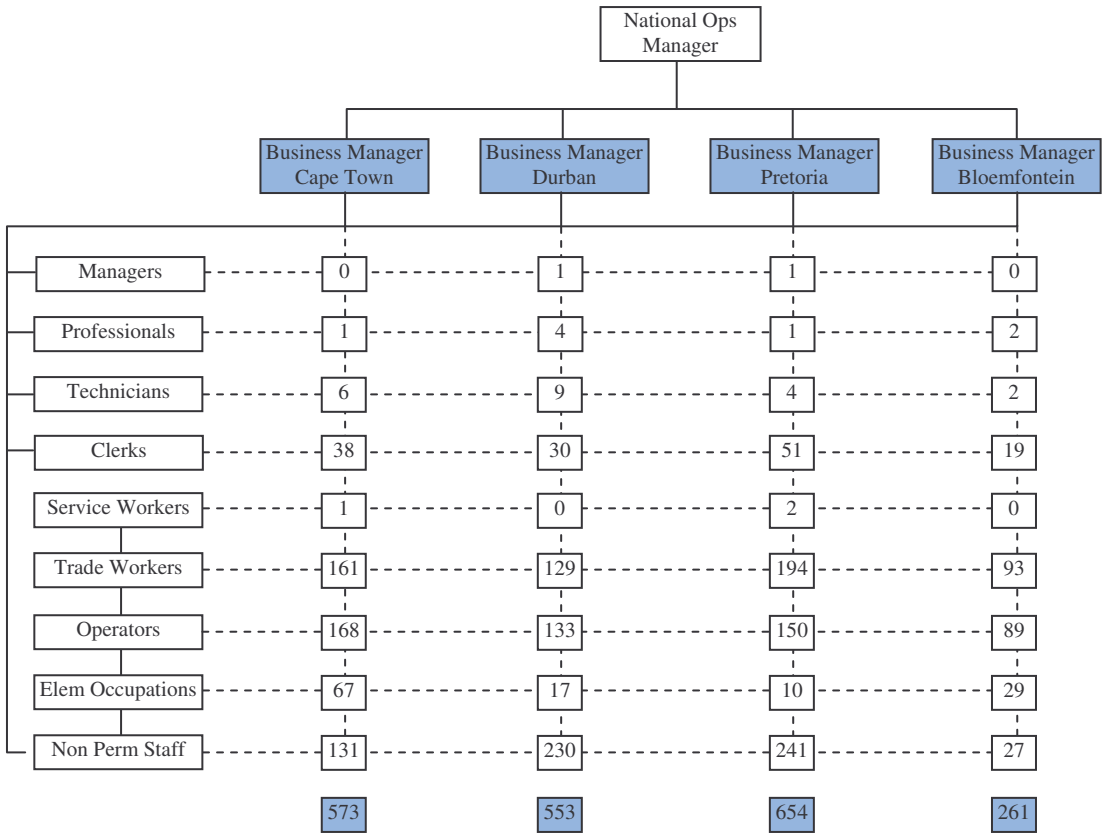


Figure 2: Coach Business Structure and Staff Complement

In terms of the implementation & roll-out of lean production and management processes, TRE has enlisted the services of a lean specialist, Competitive Dynamics, to assist in the preparation of the documentation, roll-out of the training and the set-up of the mission directed work-streams. Following the recommendations of the lean specialist, TRE management has selected several different lean tools that they foresee will lead to the improved internal service quality in support of the overall business strategy.

1.2 Business Problem

Many engineering companies in SA are faced with prospect of strong competition through globalisation and ever demanding consumers and clients. In an effort to improve their competitiveness and to protect their market share, companies have taken the decision to improve productivity and quality of final products. Various initiatives are undertaken but the incorrect selection, implementation and execution of such initiatives could have disastrous consequences for the companies due to large capital investments involved.

Lean management and manufacturing is one such set of tools that is used to reduce waste and thereby improving employee morale, service quality, throughput and cost effectiveness of the final product. Once the decision is made to implement Lean Manufacturing, how does the organisation go about ensuring that the benefits of such an investment is realised?

This research focuses on identifying factors that would assist an organisation from a human capital perspective to make the correct decision so that the organisation can amongst other things increase its productivity, improve the quality and ensure the buy-in and support of the human capital. Utilising these factors, the research intends to develop a human capital scorecard which, according to Kaplan and Norton (1993), is much more than a measurement exercise. The balanced scorecard is a management system that can motivate breakthrough improvements in critical areas such as product, process, customer & market developments. The scorecard's measures are grounded in an organisation's strategic objectives and competitive demands. By requiring

managers to select a limited number of critical indicators within each of the four perspectives (financial, customer, internal and growth), the scorecard helps focus this strategic vision of becoming a truly lean organisation.

1.3 Purpose of the Study

The purpose of the study is to determine and investigate the extent to which the various key human capital factors play an influential role in the effective implementation of Lean Manufacturing within engineering companies. South African coach manufacturing companies as part of the global arena have to continually assess the feasibility of producing their products in order to remain competitive in a niche market that is in constant threat of existing and new rivals.

Worley and Doolen (2006) explain that as organisations have struggled to remain profitable during periods of economic slowdown, many have embraced lean management as a tool to improve competitiveness. Competitive pressures compounded by increased customer expectations with respect to quality, service and price, has prompted many businesses to seek creative solutions (Caldwell, 2008). Companies that have implemented lean management would manage to focus on getting the right things, to the right place, at the right time, in the right quantity to achieve perfect workflow while minimizing waste and being flexible and able to change during these slow economic times.

The key aims of the research are to:

- To provide an insight or understanding into the research phenomenon under evaluation, focusing on human factors which influences the Lean Management implementation decision making process amongst South African manufacturing companies.
- To develop a human capital scorecard to ensure that strategic Lean Management implementation is beneficial to TRE.

- To develop a human capital model to assist TRE in terms of gaining acceptance and support of the process whilst improving the morale and performance of the employees.
- To understand the level of discipline and organisation of the workforce that is required for an effective implementation of the Lean management and production process.

1.4 Research Questions

1.4.1 What are the human capital factor elements or themes that the literature illustrates as important for an effective implementation of lean manufacturing?

1.4.2 What are the key drivers for the effective implementation of lean manufacturing from a human capital factor perspective?

1.4.3 What human capital factors promote the reluctance/resistance to effective implementation?

1.4.4 What are the strategic human capital factor objectives that should be included in the balanced scorecard in order to drive the strategic implementation of the lean management initiatives?

1.5 Assumptions

This research is focused on the development of a human capital scorecard based on the identification of key human capital factors that play a crucial role in the implementation of Lean Manufacturing. The assumptions to this research are as follows.

The first assumption is that there is a need for the implementation of lean manufacturing in the coach building industry.

The second assumption is there are common factors that can be identified which influence the decision to lean manufacturing principles in the coach building industry.

The third assumption is that the decision to implement lean manufacturing is not only based on cheaper costs and manufacturers' capacity problems.
The fourth assumption is that the participants are willing to share their knowledge and are truthful in the information they provide.

1.6 Delimitations and Limitations

This research is considered part of the ground work in identifying human capital key factors that influence the decision to lean implementation. This research focuses on TRE lean implementation as it relates to other engineering companies who have already implemented lean manufacturing principles.

Data collected during observations may be limited by the researcher's judgement of what is important enough to record.

The researcher's presence may also unintentionally affect behaviour or responses of the participants. This is due to the people performing their duties differently as they are aware of being observed.

This study will not investigate or focus on the following:

1.6.1 Lean implementation in other industries such as Information technology (IT) or car manufacturing industry. However while investigating the industry in this study, the commonalities in the literature from other industries will be reviewed and the learning's will be applied. However, participation of organisations in this study is only limited to the TRE coach business.
1.6.2 Lean implementation of other departmental functions such as IT, human resources (HR) and procurement will not be investigated.
1.6.3 Financial measures that monitor and assess the performance of the business following implementation.
1.6.4 Personnel that are not managed by way of a balanced scorecard, ie limited to only managers, junior managers and supervisors.

1.7 Significance of the Study

The coach building industry is a niche market industry requiring huge capital investments in order to compete. The market is dominated by three dominant competitors and more recently a BBBEE company that is funded by the government as part of its empowerment initiative. The research would be particularly significant in terms of highlighting the key human capital factors that is associated with the effective implementation of lean manufacturing as compared to that found in the literature survey.

With lean management implementation, whereby the frontline workers are deemed crucial for the effective implementation and execution of the process, this research would be highly significant by providing management with a human capital model that would be crucial for the effective implementation of lean manufacturing. By defining a set of human factor metrics, the study would enable the manager to select these metrics for the lean scorecard which would help focus the strategic vision of TRE.

This research would further contribute to literature by way of developing a human capital scorecard for the implementation of Lean Manufacturing using the Transnet Coach Business unit as a case study. The research would attempt to identify the strategic human factor objectives which should be included in the balanced scorecard in order to drive the strategic implementation of lean management initiatives. The balance scorecard would serve as the focal point for TRE's efforts, defining and communicating priorities to its managers, employees, and customers.

1.8 Outline of the Research Report

This study will include the following chapters:

- Chapter 1: Introduction

  This chapter aims to provide the reader with the background to the study, the business and research problem and the importance of the study. This chapter also aims to provide the reader with an overview of the population

used for the research in order to present a context for the research design and analysis of data.

- Chapter 2: Literature review

  The literature review aims to provide the reader with a theoretical overview of published works and analysis of these works that pertain to this study. The chapter aims to present a summary of the literature as a table of human factor elements that need to be considered when implementing Lean Management that can be incorporated into a balanced scorecard.

- Chapter 3: Research methodology

  This chapter will explain the methodology that was used in this study to design the research instrument, the sample population selection methods and how the research instrument was distributed to the sample. This chapter will also discuss the techniques used in the analysis of the data captured.

- Chapter 4: Research results

  This chapter will present the data collected and analysis thereof. The findings from the data analysis will be stated and discussed in this chapter. These findings will developed into a list of human factor elements and best practices for the implementation of Lean Management initiatives which will then be used to formulate a balanced scorecard for the implementation of Lean. This section aims to provide answers to the research questions in order to enrich the findings found in literature.

- Chapter 5: Conclusions and recommendations

  This chapter will summarise what was discovered in this study and present a framework that industry may use to introduce the balanced scorecard approach for the implementation of Lean. Recommendations will be proposed regarding how best to incorporate these elements into the balanced scorecard using the developed lean implementation framework. Suggestions for further research will also be proposed in this section.

1.9 Summary

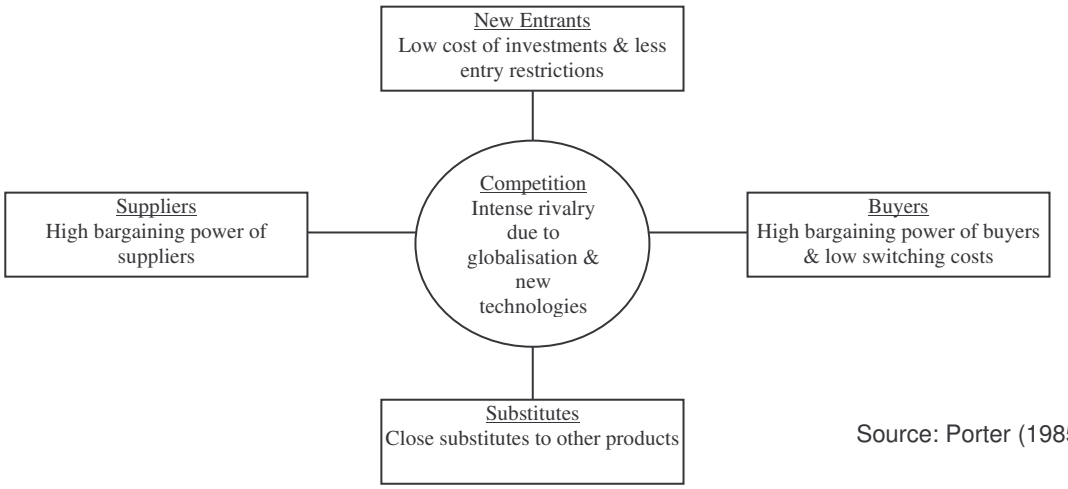
This chapter provided the reader with an introduction to the background of the research problem and an intention of the study. The specific problem facing the Coach business and the role of this research in contributing toward a solution was documented. The format and a brief overview of the dissertation was also briefly presented. The chapter also introduces Transnet Rail Engineering Coach Business. This aims to present an overview of the population from which the sample will be selected.

2. LITERATURE REVIEW

2.1 Introduction

Keeping with the objectives of the thesis of the Research Report, the literature review attempts to acquaint the readers to some of the existing literature on Lean Manufacturing, TQM and the balanced scorecard. The review then focuses on human factor aspects relating to the implementation of Lean Management within the manufacturing industry.

Globalisation and emerging technologies are having enormous impacts on the manufacturing industry around the world. This scenario has seen the exponential upsurge in new entrants to the market, prompting stiff competition in the market place (Umble *et al*, 2003). Many companies are vulnerable in that they operate in sectors where there are few barriers to new entrants and where they have little power to dictate to suppliers their needs as shown in Figure 3 below.



Source: Porter (1985)

Figure 3: Porter's five forces

As cited in (Achanga *et al*, 2006) Lean Management is hailed as a cost reduction mechanism, hence the need for its applicability in manufacturing and services industry's. Several authors have re-iterated the importance of cost factors and their reduction strategies in the current production process. They assert that, cost factors are crucial, therefore, fundamental to the

survival of most organizations (Achanga *et al*, 2006). Competitive pressures compounded by increased customer expectations with respect to quality, service and price, has prompted many businesses to seek creative solutions (Caldwell, 2008). These companies are experiencing pressures to provide the lowest total cost product with rapid order fulfilment in a highly competitive market. For many of these companies, lean management is the set of tools that assist in the identification and steady elimination of waste, or muda, improvement of quality, improvement in production time and cost reduction thereby enabling them to survive in a highly competitive global market.

Liker's (1996) perception of Lean Manufacturing that it is: "a philosophy that when implemented reduces the time from customer order to delivery by eliminating sources of waste in the production flow". The prevailing principles of lean addressing the following wastes as suggested by Philips (2002):

- Over production;
- Waiting;
- Transportation;
- Inappropriate production;
- Inventory;
- Unnecessary motion; and
- Defects.

Lean production or lean thinking (Womack et al, 1990; Womack and Jones, 1996) has its origin in the philosophy of achieving improvements in most economies with special focus on reducing *muda* (waste) whilst TQM is a company culture by increasing customer satisfaction through continuous improvements, in which all employees actively participate. By comparing this definition of TQM with the ultimate objectives of the lean producers as described above, it is obvious that there does not seem to be any contradictions between the two objectives. Todd (2000) defines lean production as "an initiative, whose goal is to reduce the waste in human effort, inventory, time to market, and manufacturing space to become highly responsive to customer demand while producing world class quality products in the most efficient and economical manner" This sentiment is supported by

Coffey (1998) where he states the lean production depends heavily upon the potential and abilities of employees in order to successfully perform many of its functions and achieve its potential. In light of the above, the development of a human scorecard for lean implementation would be highly beneficial to support the company's vision to be world class.

2.2 Strategic Implementation

Bhasin and Burcher (2006), emphasizes that whilst lean is concerned with reducing wastes at all levels, it is also about changing corporate culture. With the introduction of a balanced scorecard to measure human factors relating to lean management, employees would be unsettled by having metrics developed by corporate managers to measure performance in terms of their contribution and involvement in the lean implementation. Chase (1999), suggests that "lean is a long term plan for actually implementing a lean enterprise"; that whilst benefits are evident, companies need to view lean as a long term strategy. Emiliani (2003), suggests that the focus of lean needs to switch to the supply chain, product development, administration and behaviour if the full benefits are to be realised.

Nash and Poling (2007) highlights that many lean transformation initiatives have failed because management has failed to establish a strategic plan for implementing it. It is evident from the literature that the expectation of some management is that lean management would yield immediate results. It is evident that a clear set of metrics to measure the implementation of lean is not defined. They emphasise that a company must establish a strategic plan to guide management through this fast-paced strategic improvement transformation, which can dramatically improve customer satisfaction, employee morale and the bottom line.

2.3 Lean Philosophy

In the literature, Utley *et al* (1997) and McNabb and Sepic (1995) express that implementing a lean philosophy is not easy and that corporate culture had been blamed for numerous lean failures. However, Bartezzagni (1999) and Schonberger (1996), contest that it is introduces an alignment in ways that the members of an organization think and behave to reap the full benefits of lean. This perception is re-iterated by Henderson *et al* (1999), arguing that it is essential for the right culture to exist amongst the organisation's employees in order for the business to enjoy the full benefits of lean. A philosophy, because the more people that buy into the belief, insists Vasilash (2000), better improvements are feasible which facilitate the implementation process. This sentiment if further supported by Sim *et al* (2008) who states that effective implementation involves cultural changes in organisations, new approaches to products and to serving customers, and a high degree of training and education of employees, from upper management to the shop floor. Implementation of an initiative such as Lean Management is a fundamental shift in terms of how people need to operate in this lean environment. Sawhney and Chason (2005), also highlights that be it a manufacturing or service industry, a successful lean organisation depends on its people – both the management and the workforce. Transition from traditional to lean environment is as much, if not more, about culture change in the organisation, than about manufacturing issues.

As lean concepts permeate throughout the organisation, a profound culture change will occur: long term patterns of behaviour are disrupted, relationships are adjusted, values are re-examined, and value is redefined. This cultural change will cause conflict and disharmony, until new values and norms are established, accepted and practiced. This would constitute an organisational change and for this reason metrics can be used to focus the direction of the change (Fitz-Enz, 2009). As cited in Fitz-Enz (2009), Gary Hamel and C.K. Prahalad claim that change programs often fail due to a lack of proper measures. With the introduction of a human balanced scorecard, these

metrics can be defined and measured to ensure the success of the lean management initiative.

Burge (2008) highlights four main communicative parts to curbing resistance to change:

i. Provide stakeholders (process owners, workers, managers, executives, suppliers, etc) with a full and clear understanding of the initiative and the potential outcomes,
ii. Ease the fear of change,
iii. Create, maintain and promote an effective and easy-to-use system for communication such as daily/weekly reports, breakthrough meetings or information boards,
iv. Promote an environment where all stakeholders can share their ideas and receive feedback throughout the project life cycle.

A theoretical framework (Mehta and Shah, 2005) shown in Figure 4, indicates the key LP practices and their influence on work characteristics and outcomes.

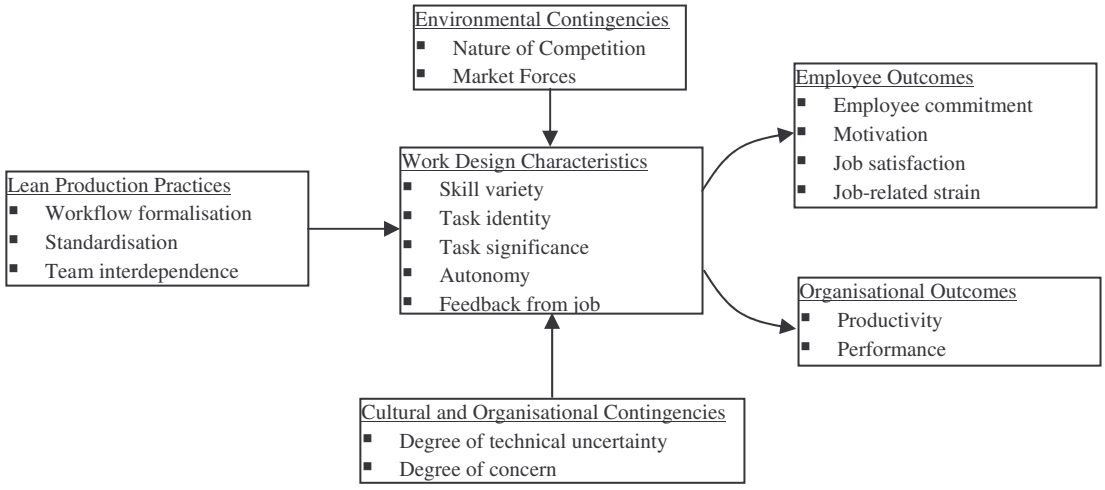


Figure 4: Conceptual framework indicating relationships between LP practices, work design characteristics and outcomes

Two particular aspects of human resource management, upon which lean production is dependent, are the commitment and involvement of workers, both essential contributors to many of the functions of Lean Management (Coffey, 1998). It can be seen in Figure 4, that lean production practices has

an impact on employee outcomes, which includes commitment, motivation, satisfaction & strain which consequentially influences organisation outcomes (productivity & performance). According to Womack & Jones (1996), the analysis of the constituent activities and techniques of lean production show that human resources (people) occupy a central position in lean production and exercise a major influence upon the implementation and success of lean production. Inherent in many of these constituent activities is a high dependence upon the employees, to an extent that non-performance by employees will severely inhibit or prevent the successful operation of lean production. The development and implementation of a balanced scorecard that focuses on the human elements of lean management will ensure a successful performance of lean production thereby improving the organisational outcomes (productivity & performance).

Worley and Doolen (2006), also states that although lean manufacturing can result in improved organisational performance, convincing managers and employees to think and act in ways that are foreign may be difficult and the tools of lean manufacturing may be resisted by employees experiencing difficulty with thinking in new terms such as customer value and waste.

Elliot (2001) insists that an organisation needs to live, breathe and mentor lean in all of its aspects. Essentially, lean needs to be seen as a mind-set that governs how one looks at the business or processes. Liker (2004) explains how an organisation can implement the management principles and business philosophy that are the basis of Toyota's reputation for high quality and profitability; he talks about the "Lean Learning Enterprise", and how Toyota continually adapts its culture to the local conditions; he proceeds to provide tips for organisations wishing to convert into a lean enterprise. Nonetheless, some caution is recommended by Hall (2004), as he suggests that the Toyota production system as practiced by Toyota may not be easily emulated by other organisations owing to the variation by which some processes are managed and the prevailing culture. Liker (2004) insists that a right combination of long-term philosophy, processes, people and problem solving is needed to convert an organisation into a lean, learning enterprise. Full and

ongoing support from top management in implementing such a change as lean will be required, together with a serious commitment by every person in the organisation to achieve this is necessary for a successful implementation. Developing an environment of openness and trust through communication and sharing of information which is valid and timely is key to this initiative.

According to Dahlgaard and Park (2006), empowerment and partnerships are the foundations on which TQM and Lean Management have been built. The pre-condition for building an excellent enterprise is empowerment.

Dahlgaard and Park (2006) argues that in order to have success with TQM and Lean Manufacturing, requires a company culture where everybody is proactively working in reducing waste and in helping each partner.

2.4 Lean Implementation

Sheridan (2000, pg 3), proposes that it takes: “three years to become competent in applying such tools as set-up reduction, standard work cell or cell building and five years to instil a firm belief in all tools”

The issue that Lathin and Mitchell (2001) stress, is the need to combine the “socio-technical systems”; that all work organizations combine a technical i.e. technology and a social systems, i.e. people, organizational structures and cultural elements. These two types of systems – the technical and the social – are interdependent; neither can perform the work of the organisation without ongoing inputs from the other. When lean methods are introduced, there is a need to consider the interaction of the new methods with (i) the existing work process and (ii) with the existing social system. Where there is a misalignment between the social and technical subsystems, however, the introduction and implementation of lean methods can be problematic and promised economic gains may not materialise. Olex (2002) is adamant that the philosophy needs to be in place for people to look creatively at what they do on a daily basis and do it better, a principle Ohno (1988) developed. This is significant in terms of a learning organisation that is part of continuous improvement of a lean

organisation. Sohal (1996) stresses that employees must take an active part in the lean change process otherwise the proposed change will be resisted. Management must create a learning environment whereby employees feel comfortable to table their ideas for improvement. By creating this environment, a metric can be created to form part of the balanced scorecard whereby employees can be measured in terms of their continuous improvement suggestions.

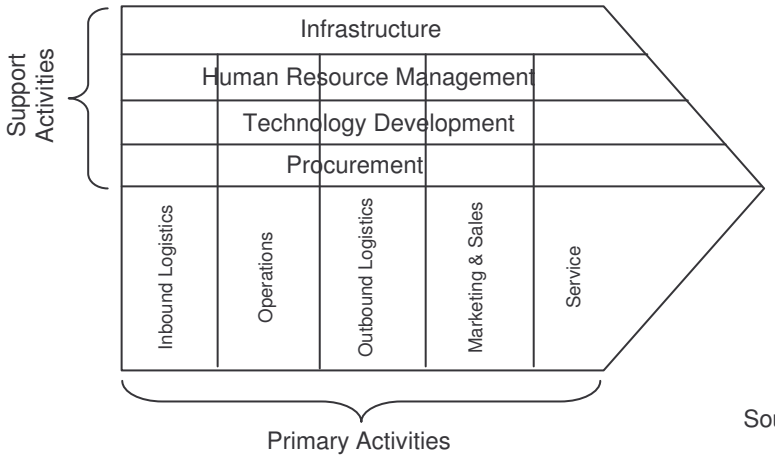
Sim *et al* (2008) states that the challenge for top management is how to get the lean and TQM techniques effectively implemented in a workforce that has built-in resistance to change because it sees using fewer people to produce more as a negative and as a long-term threat to job security.

The implementation of lean manufacturing like any other productivity improvement initiative is believed to harbour enormous difficulties (Denton and Hodgson, 1997). Hayes (2000) discussed that successful corporate initiatives like lean management, should be properly planned prior to implementation. Management involvement and commitment are perhaps the most essential prerequisites in aiding any of the desired productivity improvement initiatives (Achanga *et al*, 2006).

Gagnon *et al* (2008), stresses that the more knowledge individuals possess about a strategy the better the quality of their schemas about the strategy. This is especially the case with a lean management initiative, which mandates that employees have a clear understanding of its benefits and core principles, are empowered with more decision-making abilities and are engaged in cross-training. This sentiment is also supported by Forrester (1995).

Sawhney and Chason (2005), state that during the implementation of lean few of the major hurdles come from changes being made in the technical work system. Most problems are associated with the workforce, for example, resistance to change, lack of necessary job skills, low morale and the decision to recruit new employees or retain current workforce.

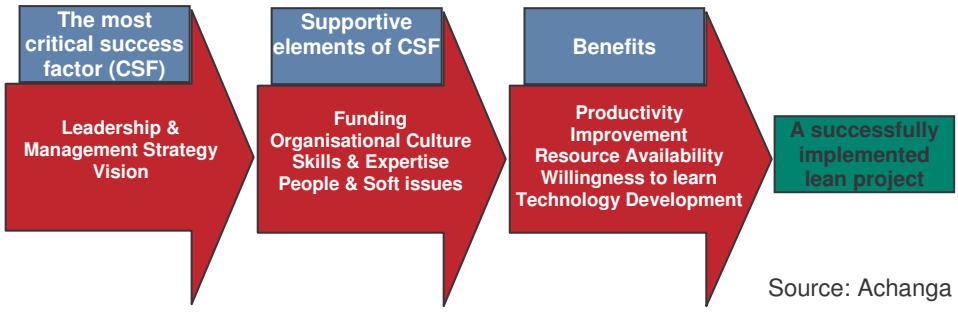
Achanga *et al* (2006) argues that most companies fear that implementing lean manufacturing is costly and time consuming. Moreover, the implementation of lean manufacturing is a strategic activity within a given organisation as shown in Figure 5. These encompass both the primary and support activities such as the firm's infrastructure, human resources management and technology development. The linkages between the primary and support activities enable an organization to minimize all its operating costs, inclusive of the execution of any productivity improvement initiative such as lean manufacturing.



Source: Porter (1985)

Figure 5: The value chain analysis

The research undertaken by Achanga *et al* (2006) realised four key main factors that are fundamental, hence, critical for the implementation of lean management and includes leadership and management, finance, skills and expertise and culture of the organization as illustrated in Figure 6.



Source: Achanga *et al* (2006)

Figure 6: Elements of critical factors for successful lean implementation

Sim *et al* (2008) argues that streamlining an established industrial firm can bring management into conflict with many subtle but deeply entrenched attitudes that resist change and the fundamental shift toward greater efficiency that these "lean" techniques promise. People must be clear about the company's position, its vision and strategy and how employees can contribute to the development and implementation of a new manufacturing system (Sohal, 1996). Changes that are newly introduced can be readily accepted if people are consulted on issues relating to process improvements and involved in the decision making regarding day-to-day problems. Communication during the implementation phase is a key aspect of a successful lean initiative.

2.5 Lean Implementation and its Human Capital Implications

There are various outlooks on the role of people in Lean, but a literature review reveals agreement on the importance of the human element. Drew *et al* (2004) point out that lean is a knowledge-intensive process and as such relies heavily on the skills of the people and how they respond to changes. Dependability and reliability of the workforce becomes more important because lean introduces fragility into the system by stretching it and removing contingencies (Womach et al, 1990; Forrester, 1995). In the context of minimising waste of any kind, it is important not only to eliminate material waste, but also waste caused by human behaviour. Behavioural productivity is as important as manufacturing productivity (Emiliani, 1998).

Needy *et al* (2002) propose company's make broad statements that people are their greatest assets though upon closer examination one often finds that the company pays lip service to this statement. A common theme is the lack of attention to the human element claim Chung (1996), Lathin and Mitchell (2001) and Bidanda *et al* (2001). Human skills such as communication, problem solving, teamwork and leadership debates (Philips, 2002), are vital for success and is resolute that people and cultural change are predominant reasons for lean failures. Forrester (1995), states that in its simplest term, lean production has to be a people-driven process, because only employees can

identify ways of improving the existing process. Several researchers emphasised that communication, teamwork, empowerment and buy-in from the employees at the shop-floor level are key to the successful implementation of lean management processes. Metrics relating to these skills are key to the development of the balanced scorecard that would enable management to measure human factor skills that would ensure successful lean implementation.

Vasilash (2001), insists an aspect of the Toyota production system which tends to be overlooked is the impact of morale and motivation. Ohno (1988) states that whilst Toyota production system's important objective was to increase production efficiency by constantly and thoroughly eliminating waste, there was an equally important respect for humanity.

Mehta and Shah (2005), highlights that current research in lean production primarily focus on examining the relationships between the implementation of lean production (LP) and the performance of the organisation; however, there is a need to assess the implications of large scale changes such as LP on word design characteristics and employees outcomes.

Parker (2003), (as cited in Mehta and Shah, 2005) indicates that several researchers indicate negative consequences of LP while others view LP as a way of achieving world class performance in a humane way with positive effects on employees. Womack *et al*. (1990), in order to enlighten the positive side of LP argues that the emphasis of LP practices on employee participation in improvement and problem solving results in greater job enlargement, cross training, and challenge; however, in contrast, others consider LP to be intensified mass production or neo-Taylorism (Parker, 2003)

According to the findings by (Mehta and Shah, 2005), a mixture of both positive and negative consequences of LP implementation on employee outcomes is reported in the literature. Klein (1989) reports that sharp reductions in inventory buffers led to a reduction in timing control for operators and increased their stress levels. To emphasise negative consequences of

LP, Turbull (1988) stated “added stress is endemic in the LP system.” In contrast, Womach *et al* (1990), suggest that LP generates an anxiety that is more akin to a “creative tension.” They argue that by rotating jobs and sharing responsibilities, multi-skilled workers can solve quality problems at their source and boost productivity. Positive consequences are also reported by Jackson and Martin (1996) where the implementation of LP practices caused an increase in work satisfaction.

Vasilash (2001), discovered the role people play: “that lean happens on the shop floor, not in the conference room, that lean must be worked repeatedly” whilst Dahlgaard and Park (2006) argues that especially with lean production and six sigma quality there seems to be too much focus on training people in tools and techniques and at the same time too little focus on understanding the human factor i.e. how to build the right company culture characterised by commitment for continuous improvement and everybody’s involvement.

Dahlgaard and Park (2006) further emphasises that more and more traditional management activities must gradually be delegated to ordinary employees together with the necessary authority and capability (education and training) to plan, check and improve these activities (eliminate waste) to the benefit of themselves and the company. The employees must be given both the freedom to plan and to decide, and the capability to take over this responsibility. In their research, Barton and Delbridge (2006), highlight that there is an apparent shift from the traditional, routinised division of labour to one where shop-floor workers are encouraged or required to contribute their tacit knowledge and experience in order to improve productivity and quality.

Nash and Poling (2007) argues that lean relies heavily on the total involvement of all employees. For most organisations today, that requires a major cultural change. Nash and Poling (2007) highlights that management roles change dramatically, in respect to process improvement during lean transformation. Management from the top down to the front line supervisor must understand what lean is, what it can do for the company, what their role is and how the results can be maximised. The greatest struggle in the quest to

achieve cultural change comes from within management. That is where the greatest resistance lies, not in the front-line employees. These human roadblocks, as they are often called, are driven by fear, reluctance to give up their perceived power or their lack of the soft skills required to supervise the workforce. Nash and Poling (2007) suggests that to combat this problem, a company should conduct introductory lean training at all levels of supervisors and management before launching an organisation wide lean initiative.

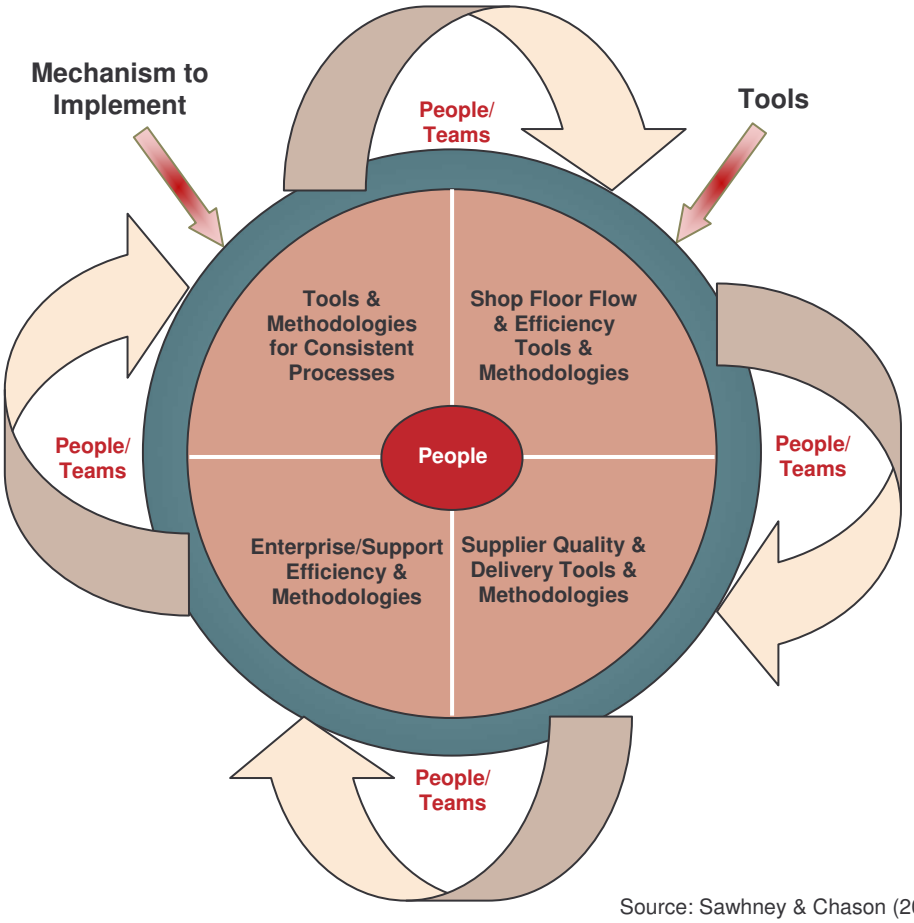
Mehta and Shah (2005) deduced that LP is particularly successful in situations where tasks are stable, repetitive and uncomplicated. They further suggest in their findings that higher autonomy, task identity and task significance will have a positive bearing on job satisfaction, motivation and employee commitment.

Gagnon *et al* (2008), states that lean management is a strategy requiring significant employees involvement to change from traditional mass manufacturing to just-in-time manufacturing, and requires employees to adopt a series of lean-congruent behaviours. Specifically, employees must change their behaviour and thinking to successfully contribute to a lean system which includes reducing waste at work stations and taking proactive actions to improve quality and workflow. The sentiment is also strongly supported by Forrester (1995), who states that in reviewing lean production, it is clear that it creates new demands from an industrial relations perspective. The culture of innovation and creative tension, focussing on the development of new, less wasteful means of production, can only be achieved through the commitment of employees to solve their own problems and generate new ways of doing their jobs in a secure environment. The creative solution for managers is to create trusting and open communication with trade unions.

Sawhney and Chason (2005), suggest that for a successful lean transition, it is thus necessary to first understand the people, the job design and expectations from the workforce, and to ensure the success of the human element. The reasons for failure cited suggest that most of the reasons for Lean failure can be linked directly or indirectly to the human element. It is thus

necessary to monitor and “engineer” (Gilbert, 1996) human performances in the same way as the performance of the production systems is engineered to perform successfully.

Based on their experience in Lean implementation and training with industry, Sawhney and Chason (2005) have created a schematic, shown in Fig 7, which provides a holistic view of the Lean process. The concept behind this schematic is that there exists a system to implement change in an organisation which is founded on people and the associated behavioural change. It is clear from the model that human capital (people) is an integral part of Lean implementation and further implies that a balanced scorecard should be in place to measure them appropriately to ensure success of the initiative.



Source: Sawhney & Chason (2005)

Figure 7: Lean Conceptual Model

2.6 Balanced Scorecard

Top executives place great emphasis on the concept of scorecards. The scorecard approach is appealing because it provides a quick comparison of key measures and examines the status of human capital in the organisation. As a management tool, scorecards can be very important to shape the direction of human capital investment and improve or maintain performance of the organisation through the implementation of preventative programs (Philips, 2005). According to Philips (2005), interest in scorecards has been phenomenal, particularly the Kaplan and Norton balanced scorecard.

Kaplan and Norton (1993), state that effective measurement must be an integral part of the management process. The balanced scorecard provides executives with a comprehensive framework that translates a company's strategic objectives into a coherent set of performance measures. They further highlight that the scorecard presents managers with four different perspectives from which to choose measures whereby it compliments traditional financial indicators with measures of performance for customers, internal processes, innovation and improvement activities. Martinsons *et al*, 1998, also highlights that the balanced scorecard has emerged as a decision support tool at a strategic management level. Many business leaders now evaluate corporate performance by supplementing financial accounting data with goal-related measures from the following perspectives: customer, internal business process, and learning and growth (Martinsons *et al*, 1998).

The advantage of the scorecard measures is that they are grounded in an organisation's strategic objective and, by requiring managers to select a limited number of critical indicators within each of the four perspectives, the scorecard helps focus this strategic vision (Kaplan and Norton,1993). Their balanced scorecard is designed to complement ''financial measures of past performance with measures of the drivers of future performance''

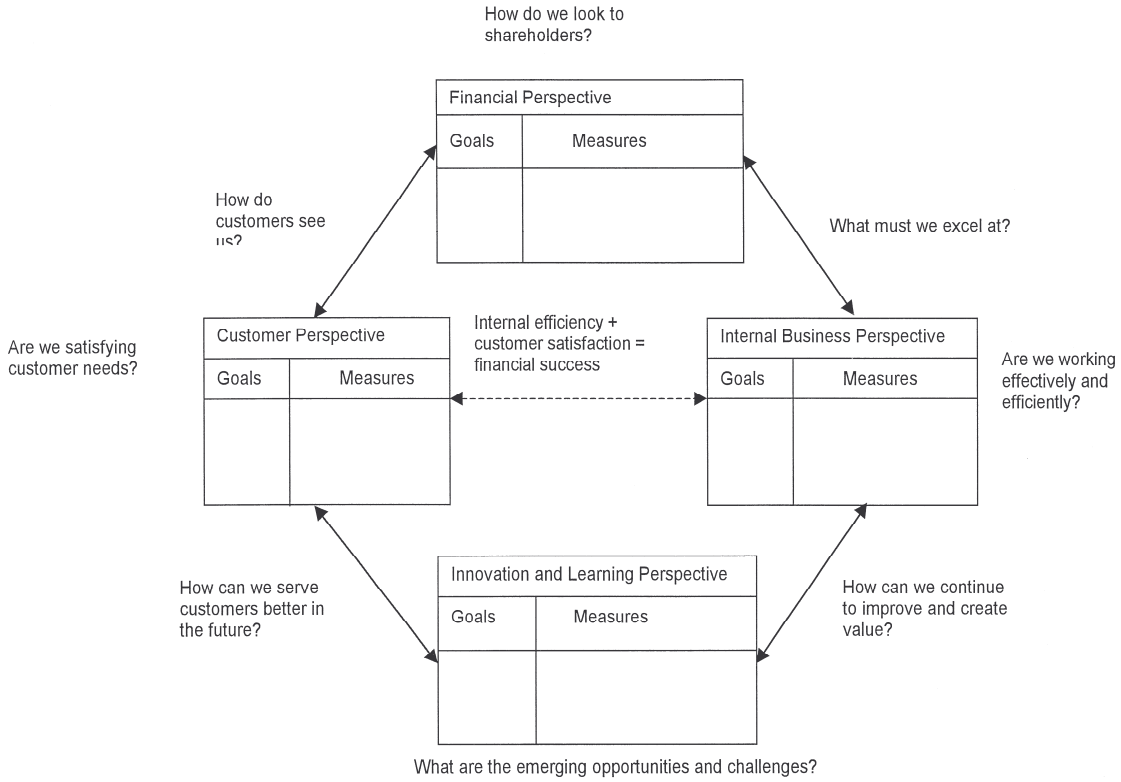
Gagnon *et al*, (2008) emphasise that the balanced scorecard approach by Kaplan & Norton (1992) is perhaps the most recent conceptualisation of

management by objective and involves more metrics. A common theme to all these approaches is the need for employees to behaviourally contribute in order to support organisational strategies.

Table 2: The four perspectives in a balanced scorecard

Customer perspective (Value-adding view)	**Financial perspective (Shareholders' view)**
Mission: to achieve our vision, by delivering value to our customers	Mission: to succeed financially, by delivering value to our shareholders
Internal perspective (Process-based view)	**Learning and growth perspective (Future view)**
Mission: to satisfy our shareholders and customers by promoting efficiency and effectiveness in our business processes	Mission: to achieve our vision, by sustaining our innovation and change capabilities, through continuous improvement and preparation for future challenges

Source: Kaplan and Norton (1996)



Source: Kaplan and Norton (1992)

Figure 8: Relationships between the four perspectives in the balanced scorecard

Table 2 outlines the four perspectives included in a balanced scorecard, and Figure 8 illustrates the relationships between them.

Martinsons *et al*, (1998), argues that the balanced scorecard concept can also be applied to measure, evaluate and guide activities that take place in specific functional areas of a business. It can even be used to shed greater light on performance at the individual project level.

Many companies are adopting the balanced scorecard as the foundation for their strategic management system. According to Martinsons *et al*, (1998), some managers have used it as they align their businesses to new strategies, moving away from cost reduction and towards growth opportunities based on more customised, value-adding products and services. Kaplan and Norton (1996) suggest that financial measures be supplemented with additional ones that reflect customer satisfaction, internal business and the ability to learn and grow. Their balanced scorecard is designed to complement "financial measures of past performance with measures of the drivers of future performances", (Kaplan and Norton, 1993, pg 8).

Philips (2005) stresses the important reasons for having a scorecard are to manage human capital effectively, optimise the status of human capital, and drive continuous improvement in the use of human capital.

Kaplan and Norton (1996) also stress the importance of adhering to three principles in order to develop a balanced scorecard that is more than a group of isolated and eventually conflicting strategies and measures:

- Build in cause-and-effect relationships;
- Include sufficient performance drivers;
- Provide linkage to financial measures.

The following steps may be appropriate in order to implement effectively the balanced human capital scorecard as a strategic management system (Kaplan and Norton, 1996):

- Clarify and translate the vision and strategy into specific action programs;
- Link strategic objectives to team and individual goals;
- Link strategic objectives to resource allocation

- Review performance data on a periodic basis, and adjust the strategy as appropriate.

2.7 Summary

The aim of the chapter has been to provide the reader with a more comprehensive understanding of the current literature on the Lean philosophy, concepts and implementation, strategic implications of lean implementation, its human capital implications and the balanced scorecard approach. This is to create an a better understanding of why companies are implementing Lean Management, what is Lean Management, what is driving this initiative and implications on the human capital when Lean implementation is involved. Finally, additional literature has been reviewed to become familiar with the balanced scorecard approach to enable the researcher to develop a Human Capital balanced scorecard for Lean implementation.

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter provides an exposition of the investigation provided in this research report. Firstly the aims of the research are clearly defined. This is important since the methodology is derived from the objectives of this study. Once the objectives were defined, it was then possible to conduct the literature review. The research problems and sub-problems were then derived. The reason for conducting field research can be summarised as follows:

- To enrich the framework with feedback received from experienced participants and best practices from study of artefacts within industry. This will aid in developing the body of knowledge.
- Compare findings of the TRE Coach Business Lean Implementation to literature. This comparison will allow for support of the developed framework and allow one to present recommendations to management of manufacturing companies like TRE Coach business.
- Understand the impact of the human capital factor key elements associated with Lean implementation and the implications thereof.
- Develop a human capital scorecard that incorporates these human capital factor elements that can be used to measure the successful implementation of Lean.

In terms of human capital factors, the literature converges to the following elements that are deemed crucial for a successful Lean implementation as illustrated in Appendix C,

- Training,
- Job roles and responsibilities
- Job empowerment
- Job multi-skilling
- Communication
- Respect for humanity

Data acquisition, sampling methods and techniques used for the research is also discussed in detailed. In addition, the issues of reliability and validity of the research methodology is reviewed.

The researcher has also proposed possible future areas of formal study that were derived from the data analysis and the propositions that this study outcome has supported.

3.2 Research Hypothesis

Against the backdrop of the literature and research sub questions the following hypotheses were made and was tested within the TRE Coach Business population. The formulation of these hypotheses is shown in Appendix C. Testing these hypotheses will assist in enriching the desired framework and allow for comparisons between literature and a typical industry like TRE Coach Business,

1. Training is an important aspect of Lean implementation within Transnet Rail Engineering Coach Business.
2. Job roles and responsibilities are directly linked to the success of Lean implementation and management.
3. Empowerment and delegation of authority are both important aspects of Lean implementation within Transnet Rail Engineering Coach Business.
4. Multi-skilling of employees through education and cross training is important to support the Lean initiative within Transnet Rail Engineering Coach Business.
5. Communication through all levels of the organisation is an important aspect of Lean implementation within Transnet Rail Engineering Coach Business.
6. Respect, trust and openness within Transnet Rail Engineering Coach Business environment supports the Lean implementation.

3.3 Research Methodology

There are two approaches to research methodologies viz. quantitative and qualitative. This study will employ a quantitative approach to research. Leedy

and Ormrod (2005) describe quantitative (also called traditional or experimental research) research as research used to answer questions about relationships among measured variables with the purpose of explaining, predicting and controlling phenomena. In contrast, qualitative research is typically used to answer questions about the complex nature of phenomena, often describing and understanding phenomena from the participant's point of view.

3.4 Research Approach

Leedy and Ormond (2005) point out that research seeks to increase understanding of the phenomenon concerned and usually follows a systematic approach typically involving eight distinct characteristics. These characteristics are:

- Research originates with a question or problem,
- Research requires clear articulation of a goal,
- Research requires a specific plan for proceeding,
- Research usually divides the principle problem into more manageable sub problems,
- Research is guided by the specific research problem, question or hypothesis,
- Research accepts certain critical assumptions,
- Research requires the collection and interpretation of data in an attempt to resolve the problem that initiated the research,
- Research is, by its nature, cyclical, or more exactly helical.

They point out that it is a cyclical involving the following process:

- Research begins with a problem: an unanswered question in the mind of the researcher,
- Research defines the goal in terms of a clear statement of the problem,
- Research subdivides the problem into appropriate sub problems,
- Research posits tentative solutions to the problem(s) through reasonable hypotheses. These hypotheses direct the researcher to appropriate data

- Research looks for data directed by the hypotheses and guided by the problem. The data is collected and organised,
- Research interprets the meaning of the data, which leads to a resolution of the problem, thus confirming or rejecting the hypotheses and/or providing an answer to the question that began the research cycle. At this point one or more new problems may emerge.

This study has now reached the stage where data needs to be collected to answer the research questions identified in the previous chapter. The most appropriate methodology should be used to obtain relevant, objective, reliable and valid data.

The research approaches available for collecting data have generally been classified into two broad categories, namely qualitative and quantitative research.

3.4.1 Qualitative research

Leedy and Ormond (2005) point out that qualitative research is typically used to answer questions about the complex nature of phenomena by describing and understanding the phenomena from the point of view of the participants.

The qualitative approach is also referred to as the interpretative, constructivist, or post-positivist approach. This usually involves inductive reasoning. A qualitative study is more likely to end with tentative answers or hypotheses about what was observed. These tentative hypotheses may form the basis of future studies. Lee (1999) emphasises that qualitative research is a process of data reduction that simultaneously enhances the data's meaning and there is little standardisation of instruments in the procedures. Qualitative researchers seek a better understanding of complex situations that are often exploratory in nature and can lead to the building of theory from the ground up.

The qualitative research process is more holistic and emergent and researchers enter the setting with an open mind (Leedy and Ormond, 2005).

Qualitative researchers construct interpretive narratives from their data and try to capture the complexity of the phenomenon under study. Often the participant's own language and perspectives are included.

3.4.2 Quantitative research

Quantitative research is used to answer questions about relationships among measured variables with the purpose of explaining, predicting, and controlling phenomena (Leedy and Ormond, 2005). This approach is sometimes referred to as the traditional, experimental or positivist approach.

A quantitative study usually ends with confirmation or disconfirmation of the hypotheses that were tested. Quantitative researchers seek explanations and predictions that will generalise to other persons and places. The intent is to establish, confirm, or validate relationships and to develop generalisations that contribute to theory. The methods selected should allow for objective measure of the variables of interest. Quantitative researchers identify one or a number of variables that they intend to study and then collect data specifically related to those variables. Quantitative researchers tend to rely more on deductive reasoning and is most often presented in the form of statistical summaries. The distinguishing characteristics of both methods are summarised in Table 3.

Table 3: Distinguishing characteristics of quantitative and qualitative research methodologies

Question	Quantitative	Qualitative
What is the purpose of the research?	To explain and predict To confirm and validate To test theory	To describe and explain To explore and interpret To build theory
What is the nature of the research process?	Focused Known variables Established guidelines Predetermined methods Somewhat context-free Detached view	Holistic Unknown variables Flexible guidelines Emergent methods Context-bound Personal view
What are the data like, and how are they collected?	Numeric data Representative, large sample Standardised instruments	Textual and/or image based data Informative, small sample Loosely structured or non-standardised observations and interviews
How are data analysed to determine their meaning?	Statistical analysis Stress on objectivity Deductive reasoning	Search for themes and categories Acknowledgement that analysis is subjective and potentially biased Inductive reasoning
How are the findings communicated?	Numbers Statistics, aggregated data Formal voice, scientific style	Words Narratives, individual quotes Personal voice, literary style

Source: Leedy and Ormond (2005:96)

From Table 3 it is evident that the main differentiating characteristics between qualitative and quantitative research methodologies relate to the differences in purpose, nature, data and data collection, data analysis and how findings are communicated.

A key distinguishing characteristic is highlighted in the first row. The two methodologies differ substantially on the purpose of the research; quantitative methodology is aimed at testing theory while qualitative methodology is more focussed on building theory.

It must be emphasised, however, that the separation is not always as distinctive as often imagined.

The purpose of this study is to confirm and validate the human capital factors that were derived from the literature. The intent is to test the theory in terms of the importance of these elements from a successful lean implementation perspective. The findings of this test will then allow the researcher to formulate these elements into metrics that could be used for the development of human capital scorecard for lean implementation.

3.5 Research Design

“Descriptive quantitative research involves either identifying the characteristics of an observed phenomenon or exploring possible correlations among two or more phenomena” (Leedy and Ormond, 2005:179).

The various descriptive quantitative research approaches include observation studies, correlation research, developmental designs and survey research. All of these approaches yield quantitative information that can be summarised through statistical analysis. An overview of the various methods is presented below (Leedy and Ormond, 2005):

Observation Studies

The focus is on a *particular* aspect of behaviour which is further quantified. In some situations, each occurrence of the behaviour is counted to determine its overall frequency. In other situations, the behaviour is rated for accuracy, intensity, maturity, or some other dimension. Regardless of the approach, the researcher strives to be as objective as possible in assessing the behaviour being studied. An observational study involves considerable advance

planning, meticulous attention to detail, a great deal of time, and, often, the help of one or more research assistants. An observational study can yield data that portray much of the richness and complexity of human behaviour. In some situations, it provides a quantitative alternative to such approaches as ethnographies and grounded theory studies.

Correlation Research

A correlation study examines the extent to which differences in one characteristic or variable are related to differences in one or more other characteristics or variables. A correlation exists if, when one variable increases, another variable either increases or decreases in a somewhat predictable fashion. In correlations studies, researchers gather data about two or more characteristics for a particular group of people or other appropriate units of study. It must be noted that the researcher can never infer a cause-and-effect relationship on the basis of correlation alone: *correlation does not indicate causation*.

Developmental Designs

Oftentimes when researchers want to study how a particular characteristic changes as people grow older, they use one of the two developmental designs, either a cross sectional study or a longitudinal study. In a cross sectional study, people from different age groups are sampled and compared. In a longitudinal study, a single group of people if followed over the course of several months or years, and data relating to the characteristic(s) under investigation are collected at various times. Cross-sectional studies are easier to conduct than longitudinal studies, because the researcher can collect all the data at a single time. In contrast, a researcher who conducts a longitudinal study must collect data over a lengthy period and invariably loses some participants along the way, perhaps because they have moved to an unknown location or perhaps they no longer want to participate.

Survey Research

Survey research involves acquiring information about one or more groups of people – perhaps about their characteristics, opinions, attitudes or previous experiences – by asking them questions and tabulating their answers. The ultimate goal is to learn about a large population by surveying a sample of that population; thus, we might call this approach a descriptive survey or normative survey. A survey is quite simple in design: the researcher poses a series of questions to willing participants; summarizes their responses with percentages, frequency counts or more sophisticated statistical indexes; and then draws inferences about a particular population from the responses of the sample. Survey research typically employs a face-to-face interview, a telephonic interview or a written questionnaire.

Of the different research designs presented, the survey research was adopted by the use of questionnaires as the most appropriate as the objective of the study is to understand the impact that the human capital factors play in Lean Management implementation within the Coach Manufacturing business of Transnet and to provide grounding for further studies in order to gain an in-depth understanding of a phenomenon which is perceived to be little understood in South Africa.

The reason for the use of survey was that the travel expenses would be minimised due to the fact that the businesses were located in different provinces. The questionnaire was therefore distributed electronically to the participants who are employed following coach businesses: Cape Town, Bloemfontein, Pretoria and Durban. From the perspective of survey participants, this distance becomes an additional advantage: participants can respond to questions with the assurance that their responses will be anonymous, and so they may be more truthful than they would be in a personal interview, particularly when they're talking about sensitive or controversial issues. The implementation of lean management at Transnet Rail Engineering is still in its infancy and is perceived to be a sensitive issue especially on the shop floor.

The research questions were answered predominantly using quantitative statistical study technique using the coach business as a case study. The general difficulty in making use of entirely statistical techniques was that the population size was not quantifiable, but for this particular research the population size is quantifiable due to the fact that coach business is selected as a case study but the results can only be generalised to Transnet Rail Engineering's internal businesses.

The research design took the form of a cross sectional dimension, collecting primary data which is ex post facto in nature as the researcher had no influence over the variables that affected the outcome of the research question.

The study was also an exploratory study and the purpose was to produce descriptive data, without inducing causality, with a view of providing direction for future study and proposition formulation.

3.6 Population Sample

Leedy and Ormond (2005) emphasise that different sampling designs may be more or less appropriate in different situations.

Diamantopoulos and Schlegelmilch (2000) identify the following sampling process:

- Define the population: Specification of the target population in terms of elements, sampling units, extent and time
- Specify the sampling frame: Specification of the listing, directory, or roster from which the sample will be chosen
- Select the sampling method: Specification of whether a probability or non-probability approach will be applied to draw the sample and exactly how the sample members will be selected
- Determine sample size: Specification of the number of sample elements to be included in the final sample as well as the number of any intermediate sampling units

- Draw the sample and collect the data: Specification of the operational procedure for the selection of sample members and carrying out the fieldwork.

An important decision in sampling is the selection of a probability or non-probability approach.

In Table 4 a summary of the selection criteria for both methods is provided. The choice of sample members for each method is explained.

Non-probability methods highlighted are convenience sampling, judgemental sampling, purposive sampling, quota sampling and multiplicity sampling.

The probability sampling methods discussed are simple random sampling, systematic sampling, stratified sampling, cluster sampling and multistage sampling.

Table 4: Selection criteria of non-probability and probability sampling methods

Selection Criteria	
Non-probability methods	
Convenience (chunk) sampling	Sample members are chose on the basis of their being readily available/accessible; thus selection is done on the basis of convenience
Judgmental sampling	Sample members are chosen on the basis of the researcher's judgement as to what constitutes a representative sample for the population of interest; thus potential sample members are screened judgmentally as to whether or not they should be included in the sample.
Purposive sampling	Sample members are chosen with a specific purpose/objective in mind; the sample is thus intentionally selected to be non-representative.
Quota sampling	Sample members are chosen on the basis of satisfying some pre-specified criteria thought to apply to the population; the researcher is free to choose which elements to include in the sample as long as they qualify on the pre-defined characteristics.
Multiplicity (snowball)	Sample members are initially chosen either judgementally or through a probability sampling method and are subsequently asked to identify others with the

sampling	desired characteristics; thus, the final sample is constructed from referrals provided by the initial respondents.
Probability methods	
Simple random sampling	Sample members are chosen randomly for inclusion in the sample, with each population element having an equal probability of being selected; further, each possible sample of *n* elements has a known and equal chance of being the one actually chosen.
Systematic sampling	Sample members are chosen at regular intervals after a random start; the sampling interval is the ration *N/n*, where *N* and *n* represent the population and desired sample size, respectively.
Stratified sampling	Sample members are chosen randomly from different segments (strata) of an overall population; each stratum may be sampled in proportion to its size in the overall population (proportionate stratified sampling) or sample members of different strata may have disproportionate chances of being selected (disproportionate stratified sampling).
Cluster sampling	Sample members are chosen in groups (clusters) rather than individually; the clusters themselves are chosen randomly from a population split into groups.
Multistage sampling	Final sample members are chosen by means of one of the other probability methods described above but a number of stages precede the final selection.

Source: Diamantopoulos and Schlegelmilch (2000:14)

From Table 4, it is evident that non-probability methods involve the application of selection criteria involving judgment on the side of the researcher on what constitutes the most appropriate method. Probability methods are random in nature.

Leedy and Ormond (2005:199) identify probability sampling as an approach where “the researcher can specify in advance that each segment of the population will be represented in the sample They point out that in the case of non-probability sampling the researcher is unable to forecast or guarantee that each element of the population will be represented in the sample.

Identifying a sufficient **sample size** is important. Larger sample sizes are desirable as they are more representative of the population. Sample size is inversely proportional to sampling error and a large sample is desirable. The

Bayesian approach for sample size determination may also be applied in order to select a sample size that maximizes the difference between the expected payoff of the sample information and the estimated cost of sampling (sampling error). Leedy and Ormrod (2005) have provided the guidelines in Table 5 for practical sample size selection:

Table 5 - Sample size selection

Population Size	Sample Size
Small population < 100	Use entire population
Approximately 500	250 (50%)
Approximately 1500	300 (20%)
Large populations > 5000	400

Source: Leedy and Ormond (2005:207)

The samples for survey research were selected to optimise the significance of the results and represent the population adequately.

In conducting the survey the entire population will be included. This is due to practical reasons given the geographic distance between the sites and the small sample frame for the study. The following summarize the sampling techniques that will be applied

a. Population: A total of 72 personnel which includes all senior managers, junior managers and supervisors.
b. The sampling frame will be obtained directly from business unit managers.
c. The sample: Due to the small size of the population it is recommended by Leedy and Ormrod (2005) as shown in Table 5. Senior managers, middle managers and supervisors who are governed by a balanced scorecard at each of the three sites will be requested to participate. Testing will be done over a month (per site). This implies that approximately 72 people will be required to complete the survey. The sample although small will still allow for enriched exploratory work as it contains perspectives from across the business, involves both parties, and engages all management levels.

3.7 Validity and Reliability of the Measuring Instrument

Leedy and Ormond (2005) highlight that two techniques are available that facilitate both evaluation and quantification of behaviours and attitudes. A checklist is a list of behaviours and characteristics or other entities that a researcher is investigating. A rating scale is more useful when a behaviour, attitude or other phenomenon of interest needs to be evaluated on a continuum. Rating scales are sometimes called Likert scales.

In compiling the questionnaire a combination of checklist and rating scales is used due to the variation in data required. The questionnaire results are both metric and non-metric in nature.

Research measurement instruments have to take note of reliability and validity. These aspects influence the extent to which results are significant, and meaningful conclusions can be drawn from them (Leedy and Ormond, 2005). The validity of a measurement is the extent to which the instrument measures what it is supposed to measure. Reliability refers to the consistency with which a measuring instrument yields a certain result when the entity being measured has not changed. Reliability is a necessary but insufficient condition for validity. Both aspects reflect the degree to which error in measurement might exist. In general validity errors reflect the biases in the instrument being used and are relatively constant sources of error. Reliability errors reflect the use of the instrument and vary unpredictably (Leedy and Ormond, 2005). Diamantopoulos and Schlegelmilch (2000) emphasise that the extent to which a particular measure is free from both systematic and random error indicates the validity of the measure and the extent to which a measure is free from random error indicates the reliability of the measure.

The validity of an instrument is in essence the extent to which the instrument measures what it is intended to measure. In the current study the use of both the desk research and the questionnaire to measure the impact of the human capital factors on Lean implementation satisfies the requirements of criterion

validity which “is the extent to which the results of an assessment instrument correlate with another related measure” (Leedy and Ormond, 2005:92).

Lee (1999), based on Yin’s theory suggests four tests that need to be conducted to establish the quality of the study.

1. Construct validity

   Construct validity is intended to establish correct operational measures for the concepts being studied. The following tactics are recommended for this purpose.

   a. Accessing multiple sources of evidence in order to capitalise on a source’s unique strengths and to compensate for its weaknesses. In conducting the study multiple sources will be used to provide the relevant data. The internet, press releases, internal documents and interviews will be used for this purpose.
   b. The researcher must establish a chain of evidence.
   c. Key informants e.g. participants should review the case study report to ensure its veracity, honesty and clarity. For purposes of this study this is considered to be a key factor and will therefore be undertaken to ensure the objectivity of the report.

   Convergence of data collected will also be determined in the process to further strengthen the validity of the construct.

2. Internal validity

   This refers to the establishment of a causal relationship whereby certain conditions are shown to lead to other conditions. This is not applicable for descriptive or exploratory studies. It is therefore irrelevant for this study as it follows a descriptive approach.

3. External validity

   It is aimed at establishing the domain to which a study’s findings can be generalised. The tactic to be used here is the replication of the case study in another situation. For purposes of this study a multiple case study approach will be used with the same approach being applied to both. Time

constraints however will only allow for only the selected case studies to be investigated. This requirement will therefore only be partially met.

4. Reliability

   The reliability of the instruments is dependent on the extent to which they yield consistent results. Reliability is pursued through a process requesting respondents to the questionnaire to answer questions seeking to test the same variable more than once in different ways. Through repetition the consistency of opinions and responses is tested. The equivalence requirements are promoted in this manner.

   The reliability and validity of the questionnaire method was promoted in the design of the instrument itself. It was decided to send out paper questionnaires. Requests to complete the questionnaire were sent out electronically to the sample frame provided by the business manager. A request was sent directly to the business manager at each of the coach business's in the various provinces to increase the response rate.

Maxwell recommends eight tactics to minimize the threats of validity. He suggests that the researcher should:

1. identify and empirically test with data as many alternative explanations as possible.
2. make a proactive effort to identify discrepant and negative cases.
3. employ triangulating methods which will serve to minimise particular biases.
4. give the study's participants a chance to react to the study's data and conclusions.
5. attempt to collect comprehensive and descriptively rich data which will also lessen the likelihood of significant omissions.
6. apply qualitative analysis where possible.
7. seek feedback from an external and neutral third party for an honest opinion.
8. compare the research, cases, or data to other research, cases, or data to enhance confidence in converging empirical results.

The above recommendations will be taken into account in conducting the study.

In conclusion a briefing session will be held with the senior managers of each of the four coach businesses once the report is drafted (but not yet finalized) to ensure honesty and clarity of the final report. Such a review will minimise incorrect interpretations by the researcher based on their own perspective on the study's data.

3.8 Data Collection Strategies

Data collection was directed in line with the topic of the study. Data collection strategies that were employed included desk research (this refers to the collection of data from internal documents, internet, the press and so forth); as well as questionnaires that will be distributed to a sample for completion and then analysed accordingly. The process was conducted throughout the four units of the Coach business.

The datasets shown in Table 6 were requested from each of the participants to derive the sample set and to test the hypothesis.

Table 6: Sample frame data fields

VARIABLE NAME	VARIABLE LABEL
Coach Business	Which Coach Business are you employed in?
JobLevel	What is your current level within the business?
Gender	What is your gender?
Race	What is your race
Training 1	My knowledge on lean has improved following the Lean training intervention
Training 2	The introductory Lean training has provided me with sufficient knowledge in order to implement the Lean initiative within my area
Training 3	I have been sufficiently trained in order to effectively train my staff to successfully implement the Lean initiative within my area
Training 4	The introductory Lean training has improved the staff's knowledge on Lean
Training 5	Lean training is important in order to successfully implement Lean within my area
Roles & Responsibility 1	Employee empowerment is important for a successful Lean implementation
Roles & Responsibility 2	I have been appropriately empowered to make decisions and suggestions in order to improve my area of control
Roles & Responsibility 3	The staff have been empowered to make decisions and suggestions in order to implement Lean
Roles & Responsibility 4	I have been delegated with the appropriate authority to plan, check and improve my work activities
Roles & Responsibility 5	I am committed to solving my own problems and generating new ways to do my jobs more effectively
Empowerment 1	Employee empowerment is important for a successful Lean implementation
Empowerment 2	I have been appropriately empowered to make decisions and suggestions in order to improve my area of control
Empowerment 3	The staff have been empowered to make decisions and suggestions in order to implement Lean
Empowerment 4	I have been delegated with the appropriate authority to plan, check and improve my work activities
Empowerment 5	I am committed to solving my own problems and generating new ways to do my jobs more effectively
Multiskilling 1	Multi-skilling of employees is an important aspect of the Lean implementation
Multiskilling 2	I have been sufficiently educated and appropriately cross trained in order to multi-task across other areas to aid the Lean initiative
Multiskilling 3	The staff within my area have received appropriate education and cross training to enable them to multi-task
Multiskilling 4	The staff within my area are constantly rotated between different jobs functions in order to improve their capability to multi task
Multiskilling 5	Employees have shown more enthusiasm to the Lean initiative following the multi-skilling intervention
Communication 1	Communication within my work area is an important aspect of Lean implementation
Communication 2	The easy-to-use communication platform is in place for us to make suggestions or to raise concerns regarding Lean
Communication 3	New initiatives concerning Lean processes and working environment are regularly communicated to us
Communication 4	There is regular feedback from management on issues or suggestions concerning Lean that are raised by us
Communication 5	Management encourages employees to communicate their suggestions and concerns
Respect_Humanity 1	Respect towards employees for their effort is an important aspect of Lean implementation
Respect_Humanity 2	Management's respect for me encourages me to contribute to the Lean implementation
Respect_Humanity 3	The staff within my work area is respected for their input and suggestions towards Lean in order to improve their work area
Respect_Humanity 4	Staff within my area shows respect and commitment towards management's decisions concerning Lean implementation
Respect_Humanity 5	Management is committed towards creating an environment of respect, trust and openness which encourages me to contribute towards the Lean implementation

3.9 Desk Research

Extensive data will be collected from internal documents, past press releases and magazine articles, web sites and a review of the implementation strategies at each site.

The alignment or non-alignment of roles between the different business units in terms of lean strategy implementation will be investigated in depth. The context surrounding the selected cases will be studied and used as a basis for the research.

3.10 Questionnaires

Based on the literature survey conducted in the area of Lean Manufacturing, it was clearly indicative that the data converges to six human factor elements,

1. Training,
2. Job roles and responsibilities,
3. Job empowerment,
4. Job multi-skilling,
5. Communication,
6. Respect for humanity.

Based on these elements a survey questionnaire was compiled for distribution to the participant in the sampling frame which is inclusive of four business units. On development of the questionnaire, it was distributed electronically to the participants for completion. The completed questionnaire was then consolidated with the assistance of the secretary at each business unit and then resubmitted to the researcher for analysis.

3.11 Data Analysis Strategies

According to Diamantopoulos and Schlegelmilch (2000) data description is a typical first step in any data analysis project. Descriptive analysis provides a useful initial examination of the data. The purpose of descriptive analysis is to:

- Provide preliminary insight as to the nature of the responses obtained, as reflected in the distribution of values for each variable of interest
- Help detect errors in the coding process
- Provide a means of presenting the data in a digestive manner through the use of tables and graphs
- Provide summary measures of ‘typical’ or ‘average’ responses as well as the extent of variation in responses for a given variable
- Provide an early opportunity for checking whether the distributional assumptions of subsequent statistical tests are likely to be satisfied

The starting point in descriptive analysis is the construction of a frequency distribution of each variable of interest. This shows in percentage terms how often the different values of the variable are encountered in the sample.

The results are presented according to the kind of scale used. The nominal and ordinal scales are presented as bar charts or pie charts. Responses are analysed in percentage terms and presented as relative frequencies. Where detailed responses were required the exact responses are recorded and presented. In terms of the Likert scale that is used for the study, the mode is the most accurate method of measuring the central location.

Data coding was required to transform it into a computer readable format. This coding to a numerical scale is necessary for the SPSS analysis and descriptive statistical purposes e.g. Gender is coded 1 to indicate males and 2 to indicate females. The code book used is shown in Table 7 below.

Table 7: Data code book

Variable Name	Value Label	Level of Measurement
Coach Business	Durban = 1 Bloemfontein = 2 Koedoespoort = 3 Salt River = 4	Nominal
Job Level	Supervisor = 1 Junior Manager = 2 Senior Manager = 3	Nominal
Gender	Male = 1 Female = 2	Nominal
Race	Black = 1 White = 2 Coloured = 3 Indian = 4	Nominal
Training	Strongly Disagree = 1 Disagree = 2 Undecided = 3 Agree = 4 Strongly Agree = 5	Ordinal
Roles and Responsibilities	Strongly Disagree = 1 Disagree = 2 Undecided = 3 Agree = 4 Strongly Agree = 5	Ordinal
Empowerment	Strongly Disagree = 1 Disagree = 2 Undecided = 3 Agree = 4 Strongly Agree = 5	Ordinal
Multi-skilling	Strongly Disagree = 1 Disagree = 2 Undecided = 3 Agree = 4 Strongly Agree = 5	Ordinal
Communication	Strongly Disagree = 1 Disagree = 2 Undecided = 3 Agree = 4 Strongly Agree = 5	Ordinal
Respect for Humanity	Strongly Disagree = 1 Disagree = 2 Undecided = 3 Agree = 4 Strongly Agree = 5	Ordinal

3.12 Timelines

It is projected the field work will be conducted in July. It is estimated that two days will be spent at each of the sites, viz, Durban, Bloemfontein, Salt River and finally Pretoria to collect data. This data will then be consolidated in August after which the final report will be written.

Due to the researcher being the National Engineering Manager at TRE Coach Business, access to the TRE environment will not be difficult. However flights and accommodation needs to be arranged for the days in Bloemfontein, Salt River and Pretoria.

3.13 Report

The report will be in the form of a scholarly manuscript that will be intended for publishing as an article in one of the management journals. The intended audience for the report is the executive managers, seniors and middle managers that are responsible for the implementation of Lean Management. It is hoped that the findings of the report and the recommendations will provide them with an understanding of how companies have successfully implemented Lean and the human factor elements that are required to be taken into consideration for the successful implementation of this initiative. This study will develop a human capital scorecard that could be used to ensure a successful Lean Management implementation.

3.14 Anonymity and confidentiality

The names of the participants will not be mentioned in the study. The questionnaire was designed in a manner to ensure that their anonymity was guaranteed. All information pertaining to this research will be treated with strict confidentiality.

3.15 Ethics

Participation in the study will be voluntary and participants will be informed about the nature of the study prior to being asked to participate. Refusal to participate in the study will be accepted at any stage during the course of the research. The primary data will at all times be treated as confidential information by the researcher. The researcher will ensure that following the analysis of the primary data, the reviewed information shall not contain names of organisations or that the respondents can the viewed by others.

3.16 Limitations

This study is limited to the sampling frame of the Coach business within Transnet Rail Engineering, and can only be generalised to business units with Transnet Rail Engineering.

The decision to focus on specifically the Coach business within Transnet Rail Engineering was due to time constraints and followed an initial positive response from the general manager of the Coach business that this study would be of interest to the organisation.

The study is also limited to only those personnel that are being managed by the use of a balanced scorecard. The reason for this is that the intent of the study is to develop a human capital scorecard for Lean implementation. Personnel below the level of supervisors in the organisation are not presently being managed by a balanced scorecard as they are governed by the main agreement between the unions and TRE management.

3.17 Summary

In this chapter the research design of this study was presented. A quantitative approach was adopted. The detailed structure of how the research was conducted was then provided, beginning with the research problems that were investigated together with the development of a model and measurement

instrument to measure those problems, the target population for the instrument and the method of distribution. Care was taken to promote the validity and reliability of the instruments. Limitations of the study have also been highlighted.

The next chapter contains the survey results. The number of received responses is discussed and the research results are displayed in graphical and tabular form accompanied by a narrative which relates the results back to the problems that were investigated.

4. RESEARCH RESULTS

4.1 Introduction

The previous chapter contained the specific details of how the research was conducted, from the problem statement to the collection of data and the methodologies applied between stages.

This chapter covers the results from the actual responses obtained from the study, beginning with the demographic data, followed by the results of each dimension. The frequencies and cumulative frequencies for all variables are shown in Appendix E and Appendix F. The mode for each of the questions is provided in Appendix G while Appendix H contains the detailed survey results.

The measurement instrument was distributed to the entire sample frame due to the size of the population (72) and a 67% response rate was achieved.

4.2 Demographic and Biographic Variables of Survey

As can be seen from Figure 9, the samples taken from each of the business units is fairly evenly distributed. This also indicates that the structures at each centre are more or less similar to each other.

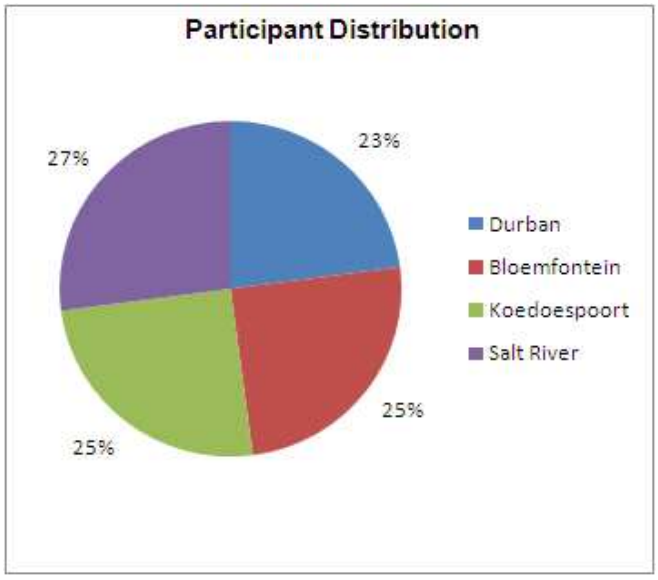


Figure 9: Distribution of participant between the four businesses

In terms of the job levels of the participants, it can be seen from Figure 10 that supervisors make up the bulk of the response at 63%, followed by junior managers at 27% and finally senior managers at 10%.

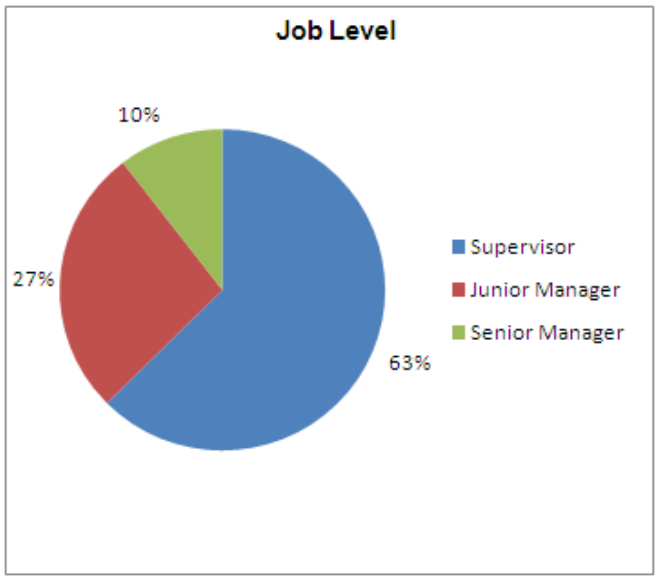


Figure 10: Job level distribution of participants

The demographic information on survey respondents indicate that 21% are female and 79% male as illustrated in Figure 11. This clearly indicates that the working environment has not yet transformed in terms of gender equity and is still male dominated.

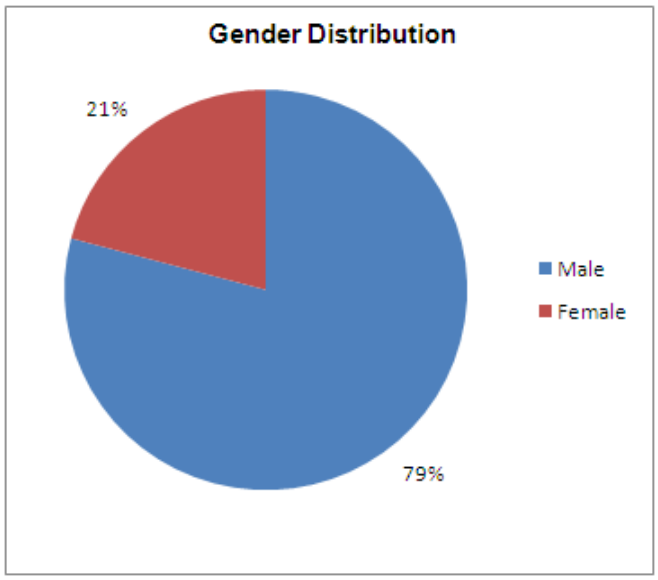


Figure 11: Gender distribution of the survey population

As shown in Figure 12, the distribution of the participants in terms of their race shows that there are more Black respondents at 48% followed by Whites at 33% and Coloureds at 19%. It must be noted that there are no Indians in the sampling frame which is the reason as why there are no responses from Indians in this survey.

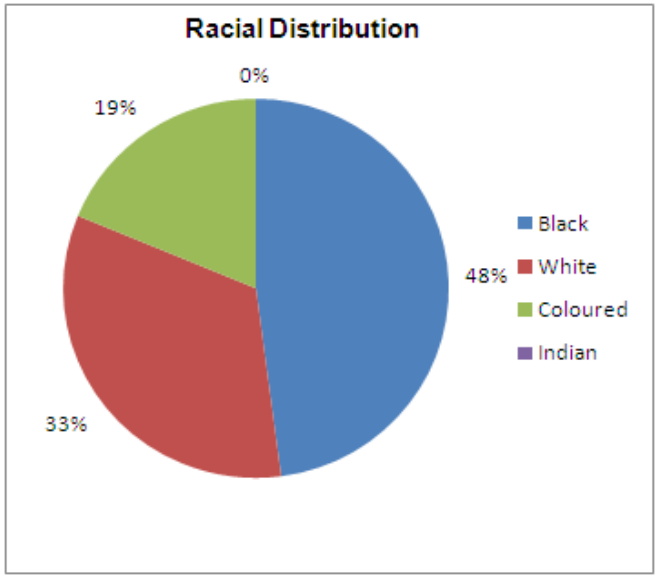


Figure 12: Racial distribution of the participants

4.3 Descriptive Statistics from Respondents

In the previous section the geographic characteristics of survey participants were presented. In this section the results of the questionnaire is presented.

4.3.1 Training

4.3.1.1 My knowledge on lean has improved following the Lean training intervention

It can be seen from Figure 13 that 52% and 19% of the respondents agree and strongly agree respectively whilst 25% of the respondents are undecided. Only 4% of respondents disagreed with the above statement. The analysis also shows that cumulatively, 71% of the respondents positively agreed with the above statement as indicated in Appendix F. The mode for this question

was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

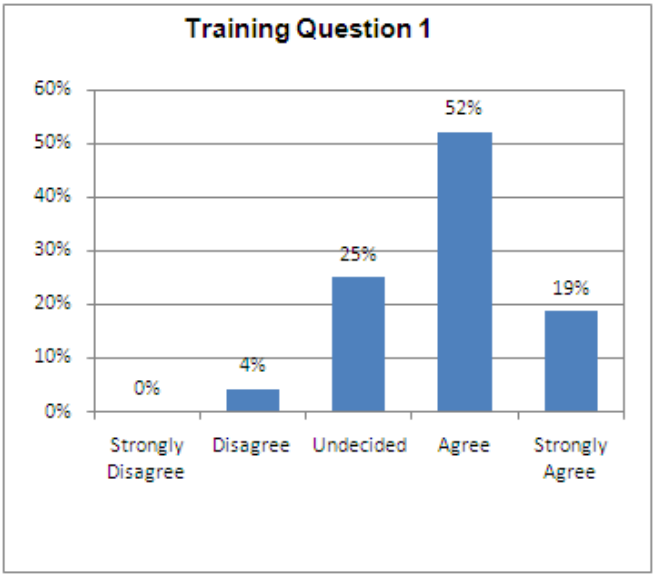


Figure 13: Distribution of responses for Training question 1

4.3.1.2 The introductory Lean training has provided me with sufficient knowledge in order to implement the Lean initiative within my area

It can be seen from Figure 14 that 56% and 13% of the respondents agree and strongly agree respectively whilst 21% of the respondents are undecided. Only 10% of respondents disagreed with the above statement. The analysis also shows that cumulatively, 69% of the respondents positively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

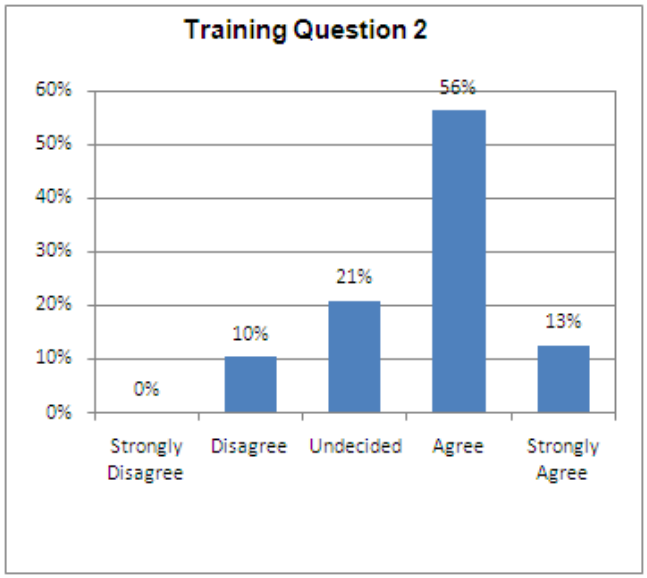


Figure 14: Distribution of responses for Training question 2

4.3.1.3 I have been sufficiently trained in order to effectively train my staff to successfully implement the Lean initiative within my area

It can be seen from Figure 15 that 38% and 17% of the respondents agree and strongly agree respectively whilst a higher percentage of the respondents (31%) are undecided as compared to the previous two questions. 13% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 54% of the respondents positively agreed with the above statement whilst 15% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

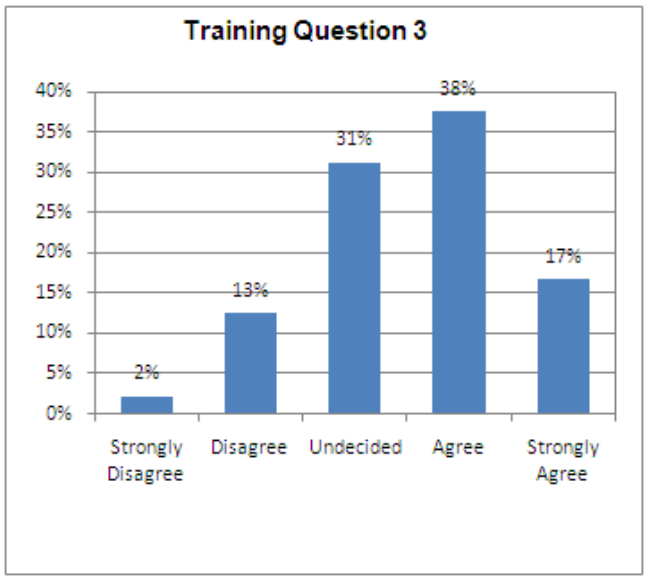


Figure 15: Distribution of responses for Training question 3

4.3.1.4 The introductory Lean training has improved the staff's knowledge on Lean

It can be seen from Figure 16 that 40% and 8% of the respondents agree and strongly agree respectively whilst the majority of the respondents (42%) are undecided. 8% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 48% of the respondents positively agreed with the above statement whilst 10% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 3, as shown in Appendix G, which illustrates that most respondents were undecided in terms of the above statement.

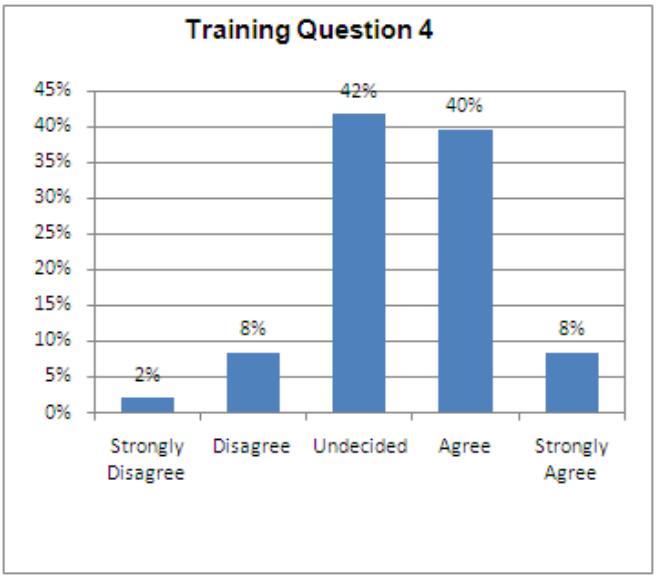


Figure 16: Distribution of responses for Training question 4

4.3.1.5 Lean training is important in order to successfully implement Lean within my area

It can be seen from Figure 17 that 50% and 35% of the respondents agree and strongly agree respectively whilst 10% of the respondents are undecided. 4% of respondents strongly disagreed with the above statement. The analysis also shows that cumulatively, 85% of the respondents positively agreed with the above statement whilst 4% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

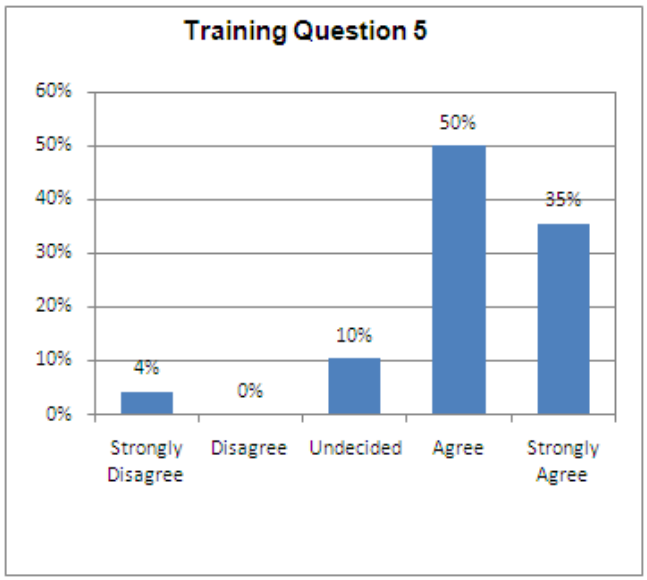


Figure 17: Distribution of responses for Training question 5

It can be seen from the frequency distributions in Table 8 below that there is a positive pattern that more of the participants agree with the statements related to Lean training intervention. It must be noted that 42% of the participants responded as undecided to question 4. Training would therefore be an important metric that should be included as part of the balanced scorecard on the learning perspectives quadrant.

Table 8: Variable Frequencies for Questions related to Training

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Training Q1	0%	4%	25%	52%	19%
Training Q2	0%	10%	21%	56%	13%
Training Q3	2%	13%	31%	38%	17%
Training Q4	2%	8%	42%	40%	8%
Training Q5	4%	0%	10%	50%	35%

4.3.2 Job Roles and Responsibilities

4.3.2.1 My previous roles and responsibilities was not appropriate for a Lean environment

It can be seen from Figure 18 that cumulatively 35% of the respondents positively agreed with the statement whilst a fairly large number of

respondents (33%) are undecided. The analysis also shows that cumulatively, 31% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 3, as shown in Appendix G, which illustrates that most respondents were undecided in terms of the above statement.

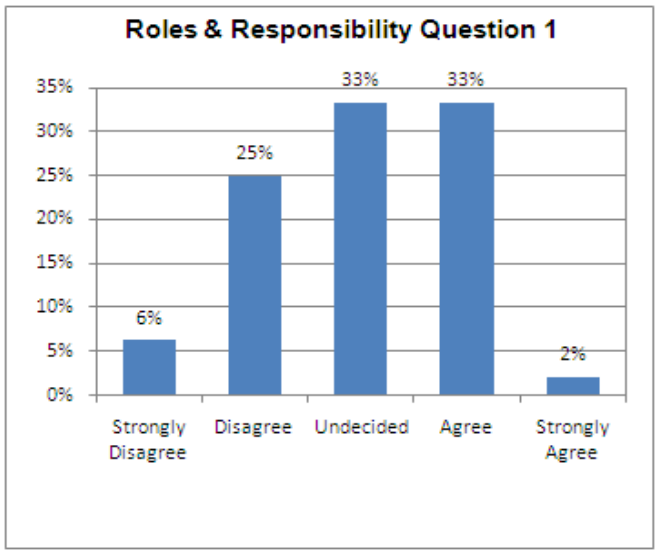


Figure 18: Distribution of responses for Roles & Responsibilities question 1

4.3.2.2 My new role and responsibilities has helped me to implement Lean within my work area

It can be seen from Figure 19 that 60% and 13% of the respondents agree and strongly agree respectively whilst 21% of the respondents are undecided. 4% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 73% of the respondents positively agreed with the above statement whilst 6% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

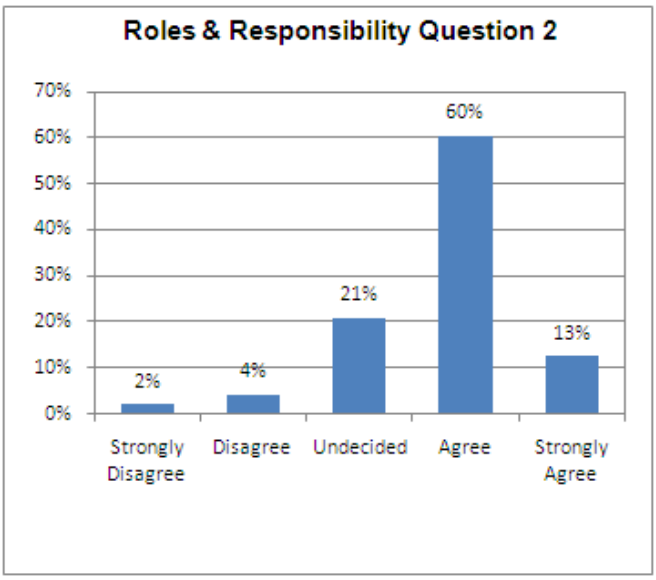


Figure 19: Distribution of responses for Roles & Responsibilities question 2

4.3.2.3 The roles and responsibilities of my staff has had to change in order to implement Lean

It can be seen from Figure 20 that 54% and 15% of the respondents agree and strongly agree respectively whilst 13% of the respondents are undecided. 19% of respondents disagreed with the above statement. The analysis also shows that cumulatively, 69% of the respondents positively agreed with the above statement whilst 19% negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

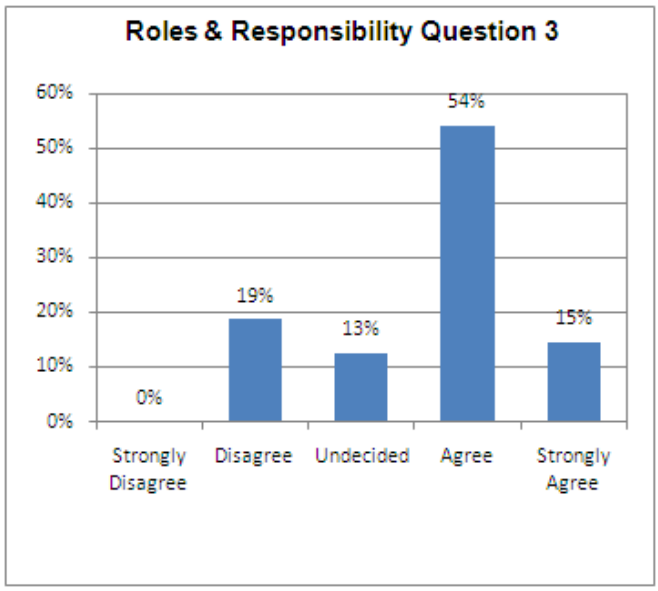


Figure 20: Distribution of responses for Roles & Responsibilities question 3

4.3.2.4 The staff has a clear understanding of their new roles and responsibilities to suite the new Lean processes

It can be seen from Figure 21 that 33% and 8% of the respondents agree and strongly agree respectively whilst the majority of the respondents (46%) are undecided. 10% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 41% of the respondents positively agreed with the above statement whilst 12% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 3, as shown in Appendix G, which illustrates that most respondents were undecided in terms of the above statement.

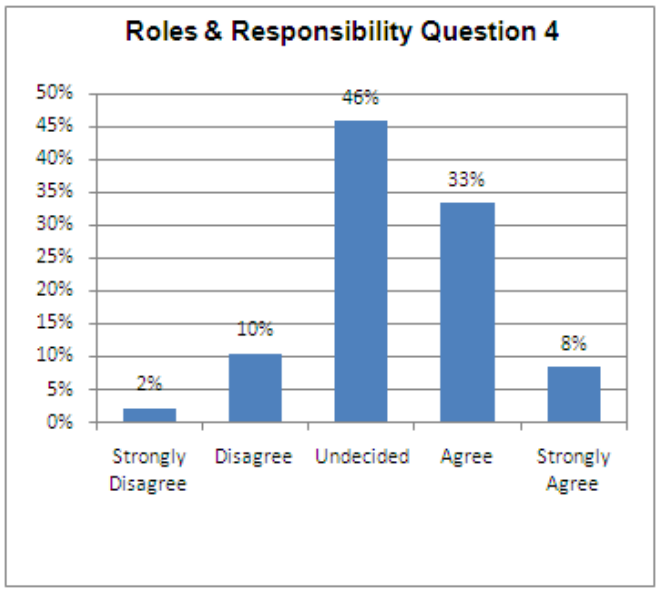


Figure 21: Distribution of responses for Roles & Responsibilities question 4

4.3.2.5 A change in terms of the roles and responsibilities was necessary in order to successfully implement Lean

It can be seen from Figure 22 that 50% and 17% of the respondents agree and strongly agree respectively whilst 27% of the respondents are undecided. Only 6% of respondents disagreed with the above statement. The analysis also shows that cumulatively, 67% of the respondents positively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

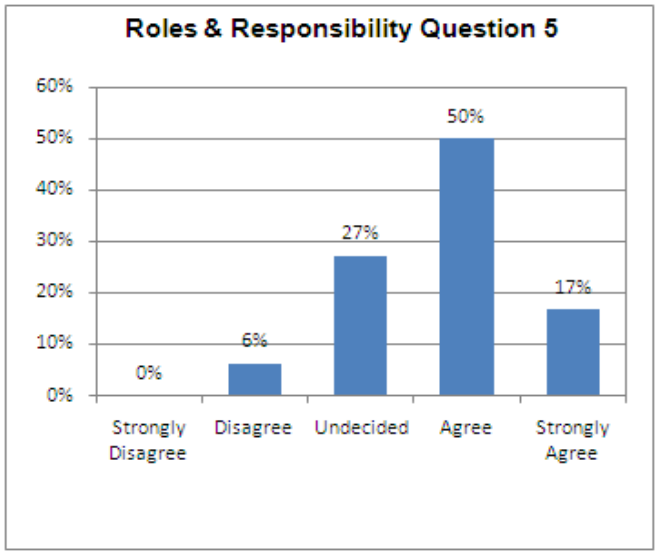


Figure 22: Distribution of responses for Roles & Responsibilities question 5

It can be seen from the frequency distributions in Table 9 below that there is a positive pattern that more of the participants agree with the statements related to Roles & Responsibilities associated with Lean implementation. Roles & responsibilities would therefore be an important metric that should be included as part of the balanced scorecard on the learning perspectives quadrant. However, it must be noted that a fair amount of participants were undecided in terms of their responses to question 1 and question 4. Cumulatively as shown in Appendix F, 35% of the participants either agreed or strongly agreed for question 1 but 46% of the participants remain largely undecided on question 4.

Table 9: Variable Frequencies for Questions related to Roles & Responsibilities

Roles & Responsibilities Q1	6%	25%	33%	33%	2%
Roles & Responsibilities Q2	2%	4%	21%	60%	13%
Roles & Responsibilities Q3	0%	19%	13%	54%	15%
Roles & Responsibilities Q4	2%	10%	46%	33%	8%
Roles & Responsibilities Q5	0%	6%	27%	50%	17%

4.3.3 Job Empowerment

4.3.3.1 Employee empowerment is important for a successful Lean implementation

It can be seen from Figure 23 that 52% and 42% of the respondents agree and strongly agree respectively whilst only 6% of the respondents are undecided. It is strongly highlighted that cumulatively, 94% of the respondents positively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

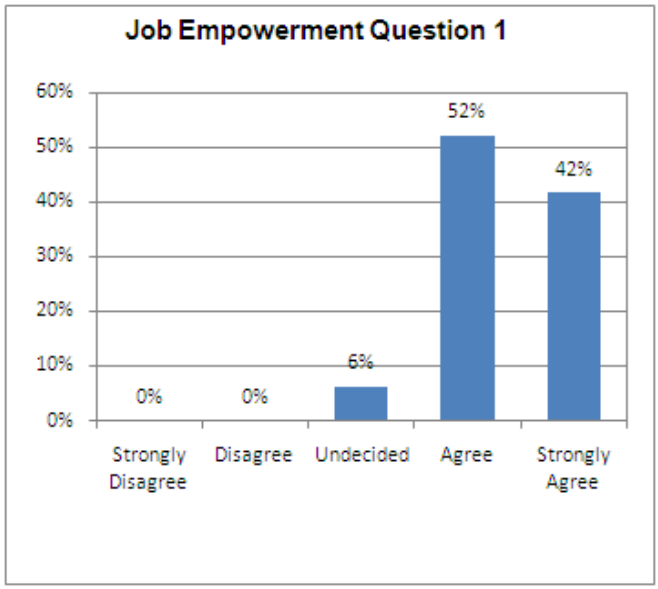


Figure 23: Distribution of responses for Empowerment question 1

4.3.3.2 I have been appropriately empowered to make decisions and suggestions in order to improve my area of control

It can be seen from Figure 24 that 56% and 23% of the respondents agree and strongly agree respectively whilst 17% of the respondents are undecided. Only 4% of respondents disagreed with the above statement. The analysis also shows that cumulatively, 79% of the respondents positively agreed with the above statement whilst 4% of the respondents negatively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

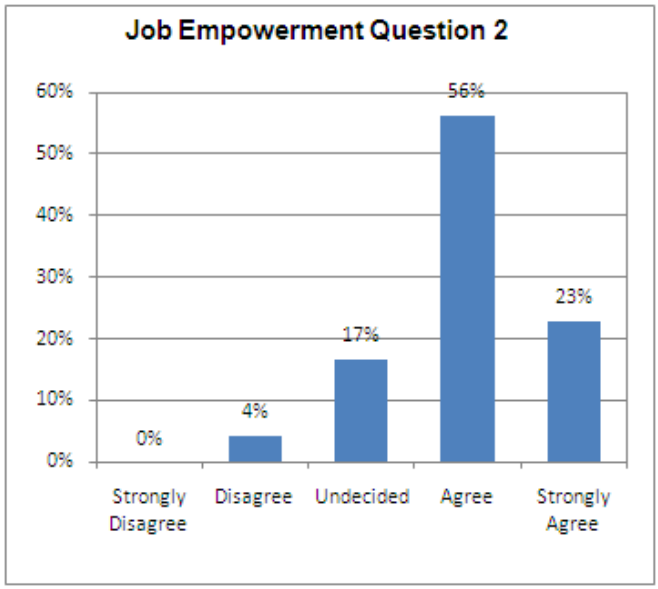


Figure 24: Distribution of responses for Empowerment question 2

4.3.3.3 The staff have been empowered to make decisions and suggestions in order to implement Lean

It can be seen from Figure 25 that 56% and 19% of the respondents agree and strongly agree respectively whilst 23% of the respondents are undecided. Only 2% of respondents disagreed with the above statement. The analysis also shows that cumulatively, 75% of the respondents positively agreed with the above statement whilst 2% of the respondents negatively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

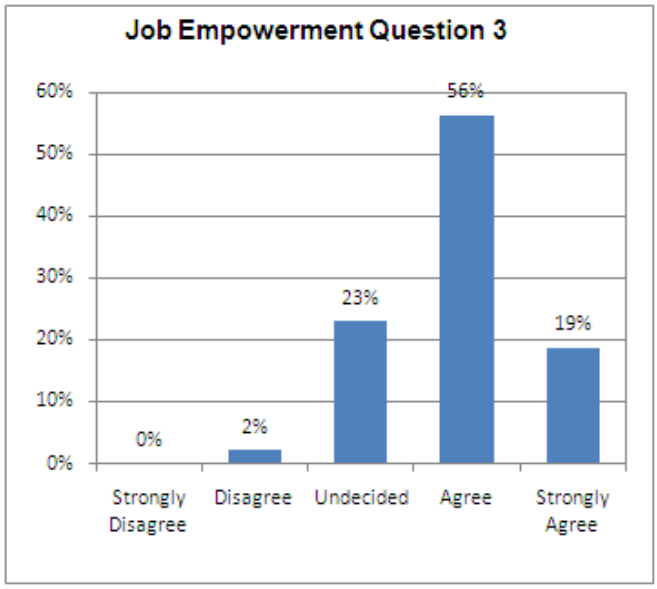


Figure 25: Distribution of responses for Empowerment question 3

4.3.3.4 I have been delegated with the appropriate authority to plan, check and improve my work activities

It can be seen from Figure 26 that 69% and 10% of the respondents agree and strongly agree respectively whilst 19% of the respondents are undecided. Only 2% of respondents disagreed with the above statement. The analysis also shows that cumulatively, 79% of the respondents positively agreed with the above statement whilst 2% of the respondents negatively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

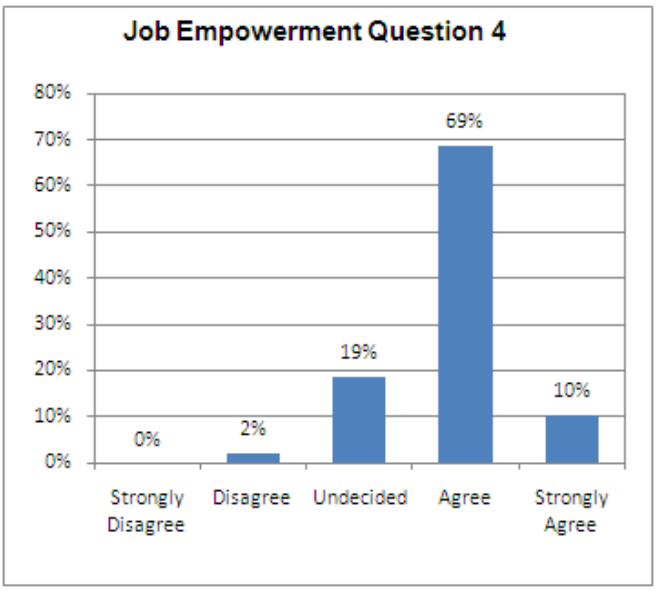


Figure 26: Distribution of responses for Empowerment question 4

4.3.3.5 I am committed to solving my own problems and generating new ways to do my jobs more effectively

It can be seen from Figure 27 that 56% and 38% of the respondents agree and strongly agree respectively whilst only 6% of the respondents are undecided. It is strongly depicted that cumulatively, 94% of the respondents positively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

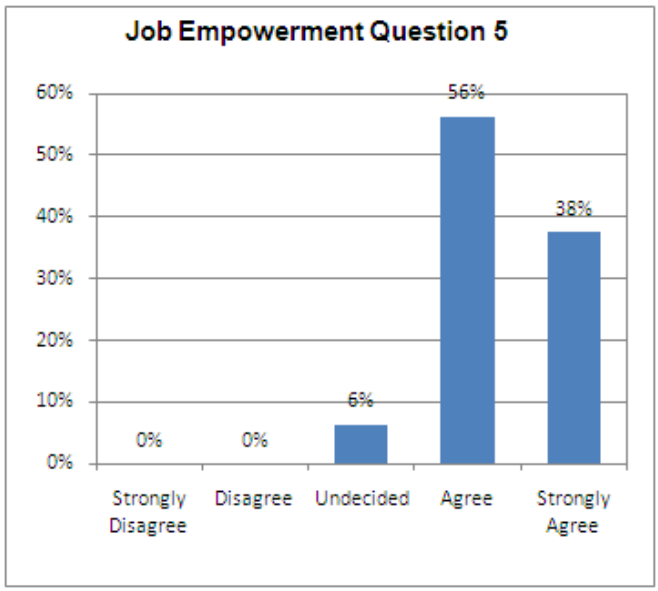


Figure 27: Distribution of responses for Empowerment question 5

It can be seen from the frequency distributions in Table 10 below that there is a positive pattern that more of the participants agree with the statements related to Job Empowerment in terms of Lean implementation. Empowerment would therefore be an important metric that should be included as part of the balanced scorecard on the learning perspectives quadrant.

Table 10: Variable Frequencies for Questions related to Job Empowerment

Empowerment Q1	0%	0%	6%	52%	42%
Empowerment Q2	0%	4%	17%	56%	23%
Empowerment Q3	0%	2%	23%	56%	19%
Empowerment Q4	0%	2%	19%	69%	10%
Empowerment Q5	0%	0%	6%	56%	38%

4.3.4 Job Multi-skilling

4.3.4.1 Multi-skilling of employees is an important aspect of the Lean implementation

It can be seen from Figure 28 that 58% and 31% of the respondents agree and strongly agree respectively whilst 8% of the respondents are undecided. Only 2% of respondents disagreed with the above statement. It is strongly depicted that cumulatively, 89% of the respondents positively agreed with the

above statement whilst 2% of the respondents negatively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

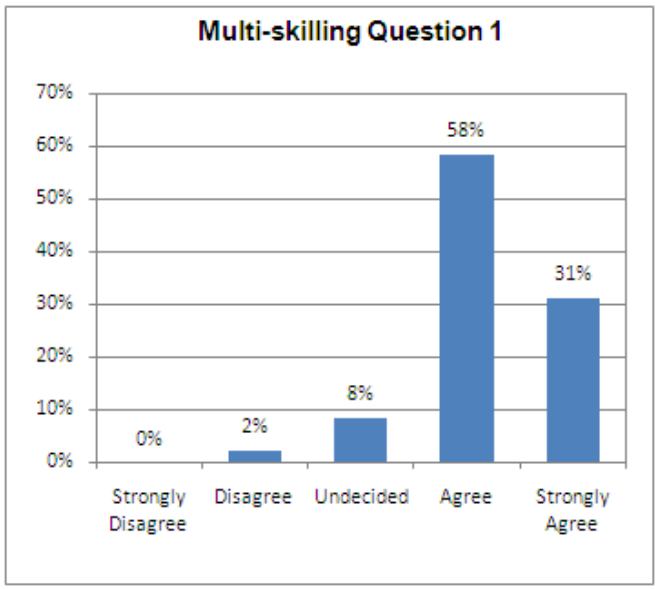


Figure 28: Distribution of responses for Multi-skilling question 1

4.3.4.2 I have been sufficiently educated and appropriately cross trained in order to multi-task across other areas to aid the Lean initiative

It can be seen from Figure 29 that 42% and 8% of the respondents agree and strongly agree respectively whilst 38% of the respondents are undecided. 8% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 50% of the respondents positively agreed with the above statement whilst 10% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

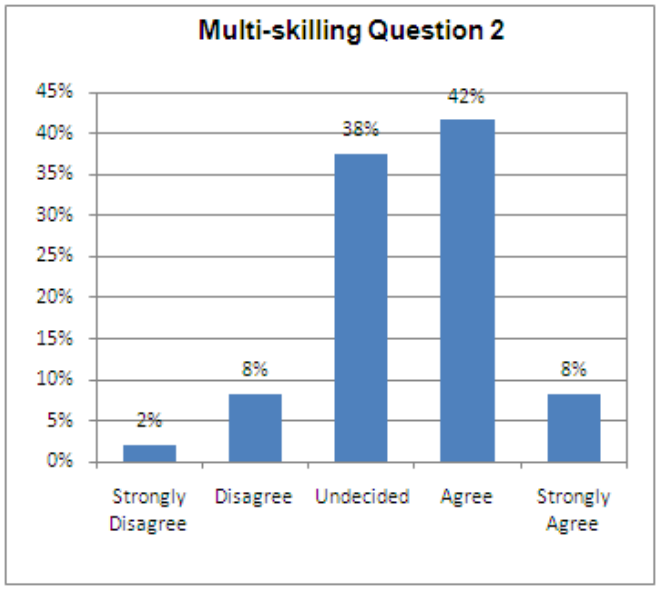


Figure 29: Distribution of responses for Multi-skilling question 2

4.3.4.3 The staff within my area have received appropriate education and cross training to enable them to multi-task

It can be seen from Figure 30 that 27% and 4% of the respondents agree and strongly agree respectively whilst the majority of the respondents (48%) are undecided. 19% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 31% of the respondents positively agreed with the above statement whilst 21% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 3, as shown in Appendix G, which illustrates that most respondents were undecided in terms of the above statement.

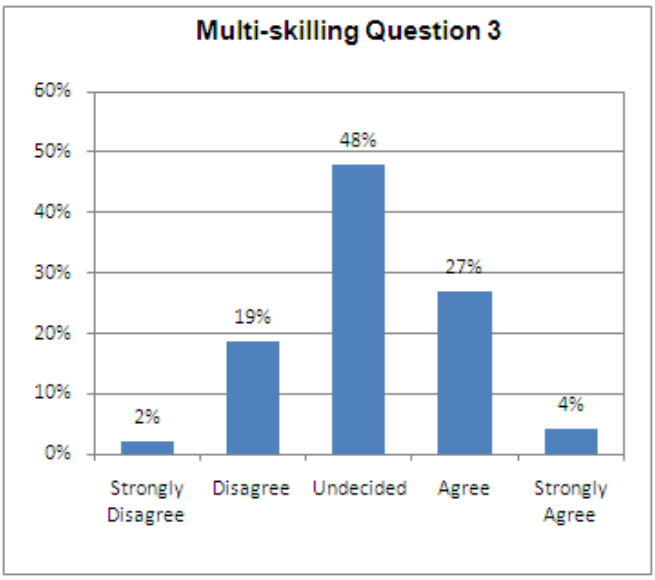


Figure 30: Distribution of responses for Multi-skilling question 3

4.3.4.4 The staff within my area are constantly rotated between different jobs functions in order to improve their capability to multi task

It can be seen from Figure 31 that 35% and 8% of the respondents agree and strongly agree respectively whilst 33% of the respondents are undecided. 19% of respondents disagreed and 4% strongly disagreed with the above statement. The analysis also shows that cumulatively, 43% of the respondents positively agreed with the above statement whilst 23% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

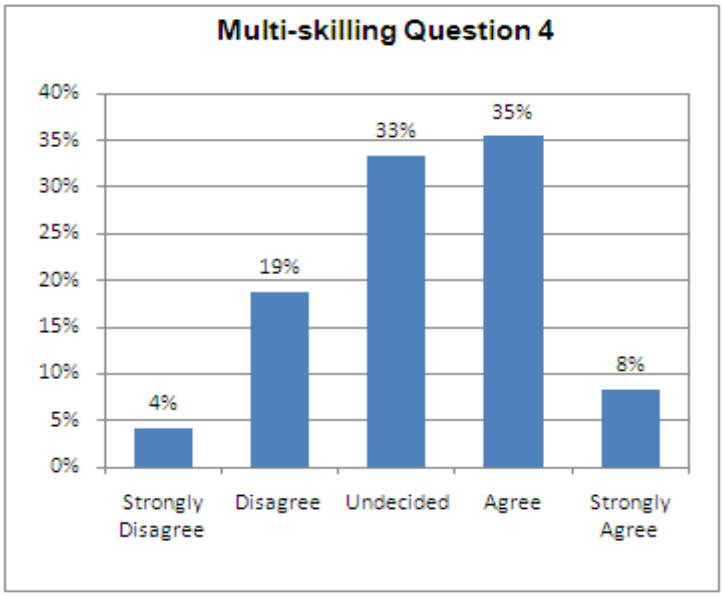


Figure 31: Distribution of responses for Multi-skilling question 4

4.3.4.5 Employees have shown more enthusiasm to the Lean initiative following the multi-skilling intervention

It can be seen from Figure 32 that 27% and 2% of the respondents agree and strongly agree respectively whilst the majority of the respondents (35%) are undecided. 25% of respondents disagreed and 10% strongly disagreed with the above statement. The analysis also shows that cumulatively, 29% of the respondents positively agreed with the above statement whilst a large percentage of the respondents (35%) negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents were undecided in terms of the above statement.

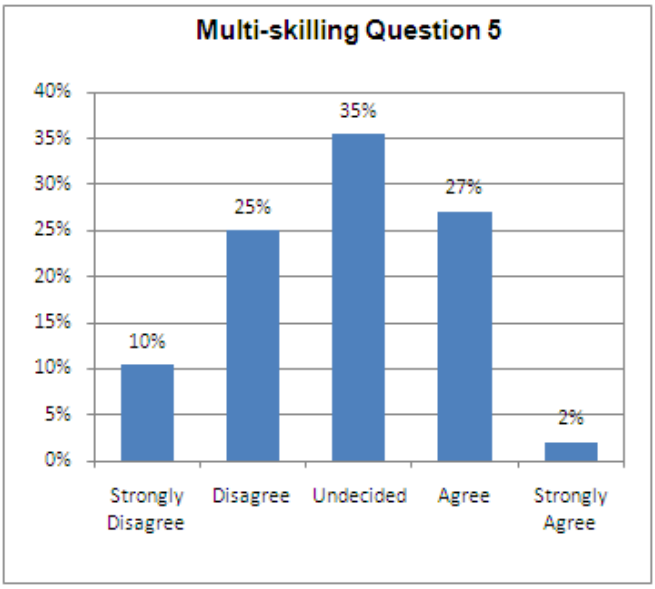


Figure 32: Distribution of responses for Multi-skilling question 5

It can be seen from the frequency distributions in Table 11 below that there is a positive pattern that more of the participants agree with the statements related to Job multi-skilling associated with Lean implementation. Job multi-skilling would be an important metric that should be included as part of the balanced scorecard on the learning perspectives quadrant. However, it must be noted that a fair amount of participants were undecided in terms of their responses to question 3 and question 5. Cumulatively as shown in Appendix F, 48% of the respondents remain largely undecided on questions 3 and 35 % on question 5, whilst 35% of the respondents disagreed with question 5.

Table 11: Variable Frequencies for Questions related to Job Multi-skilling

Multiskilling Q1	0%	2%	8%	58%	31%
Multiskilling Q2	2%	8%	38%	42%	8%
Multiskilling Q3	2%	19%	48%	27%	4%
Multiskilling Q4	4%	19%	33%	35%	8%
Multiskilling Q5	10%	25%	35%	27%	2%

4.3.5 Communication

4.3.5.1 Communication within my work area is an important aspect of Lean implementation

It can be seen from Figure 33 that 65% and 31% of the respondents agree and strongly agree respectively whilst only 4% of the respondents are undecided. It is strongly depicted that cumulatively, 96% of the respondents positively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

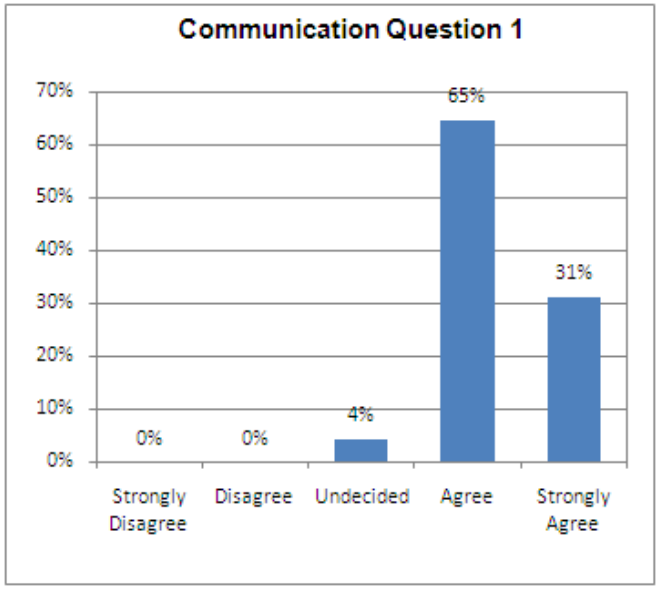


Figure 33: Distribution of responses for Communication question 1

4.3.5.2 The easy-to-use communication platform is in place for us to make suggestions or to raise concerns regarding Lean

It can be seen from Figure 34 that 54% and 17% of the respondents agree and strongly agree respectively whilst 25% of the respondents are undecided. 2% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 71% of the respondents positively agreed with the above statement whilst 4% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode

for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

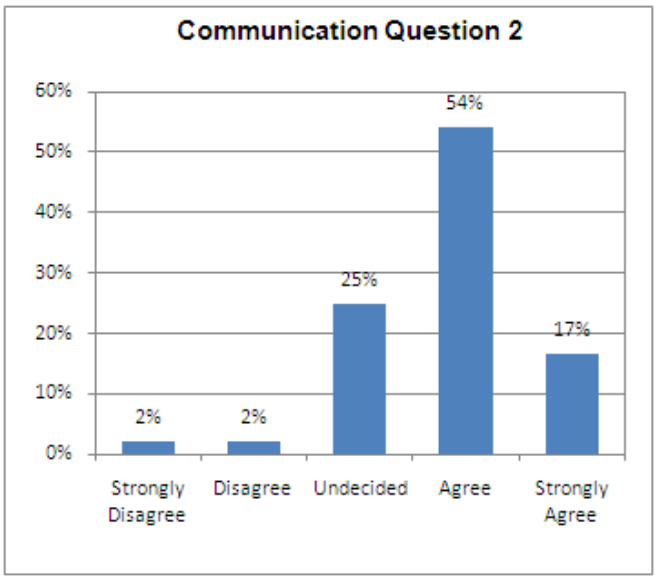


Figure 34: Distribution of responses for Communication question 2

4.3.5.3 New initiatives concerning Lean processes and working environment are regularly communicated to us

It can be seen from Figure 35 that 65% and 8% of the respondents agree and strongly agree respectively whilst 21% of the respondents are undecided. Only 6% of respondents disagreed with the above statement. It is strongly depicted that cumulatively, 73% of the respondents positively agreed with the above statement whilst 6% of the respondents negatively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

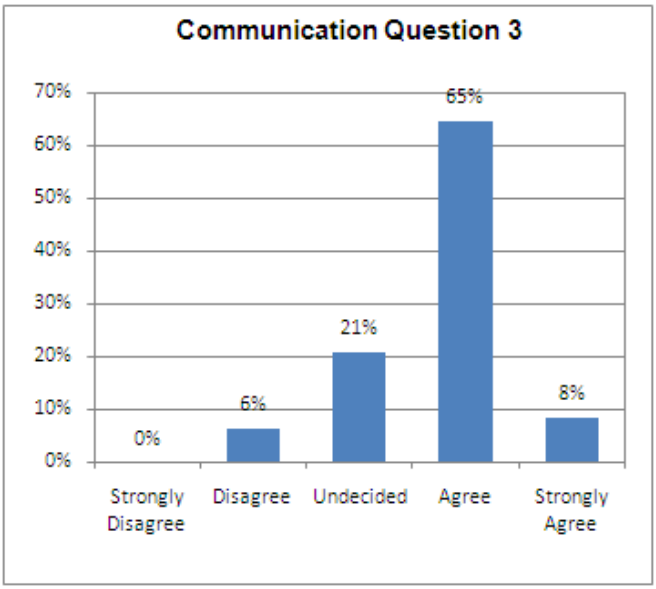


Figure 35: Distribution of responses for Communication question 3

4.3.5.4 There is regular feedback from management on issues or suggestions concerning Lean that are raised by us

It can be seen from Figure 36 that 48% and 6% of the respondents agree and strongly agree respectively whilst 25% of the respondents are undecided. 17% of respondents disagreed and 4% strongly disagreed with the above statement. The analysis also shows that cumulatively, 54% of the respondents positively agreed with the above statement whilst 21% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

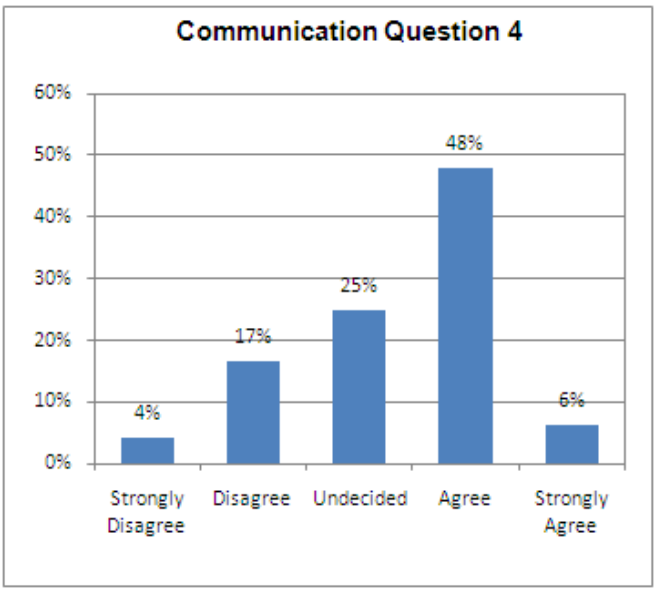


Figure 36: Distribution of responses for Communication question 4

4.3.5.5 Management encourages employees to communicate their suggestions and concerns

It can be seen from Figure 37 that 58% and 27% of the respondents agree and strongly agree respectively whilst 15% of the respondents are undecided. 8% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 75% of the respondents positively agreed with the above statement whilst 10% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

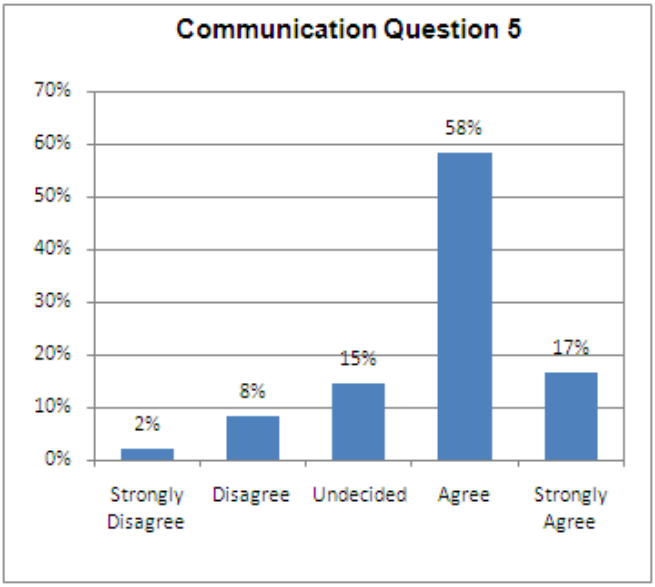


Figure 37: Distribution of responses for Communication question 5

It can be seen from the frequency distributions in Table 12 below that there is a positive pattern that more of the participants agree with the statements related to Job Communication in terms of Lean implementation. Communication would therefore be an important metric that should be included as part of the balanced scorecard on the learning perspectives quadrant.

Table 12: Variable Frequencies for Questions related to Communication

Communication Q1	0%	0%	4%	65%	31%
Communication Q2	2%	2%	25%	54%	17%
Communication Q3	0%	6%	21%	65%	8%
Communication Q4	4%	17%	25%	48%	6%
Communication Q5	2%	8%	15%	58%	17%

4.3.6 Respect for Humanity

4.3.6.1 Respect towards employees for their effort is an important aspect of Lean implementation

It can be seen from Figure 38 that 65% and 25% of the respondents agree and strongly agree respectively whilst 8% of the respondents are undecided.

Only 2% of respondents disagreed with the above statement. It is strongly depicted that cumulatively, 90% of the respondents positively agreed with the above statement whilst 2% of the respondents negatively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

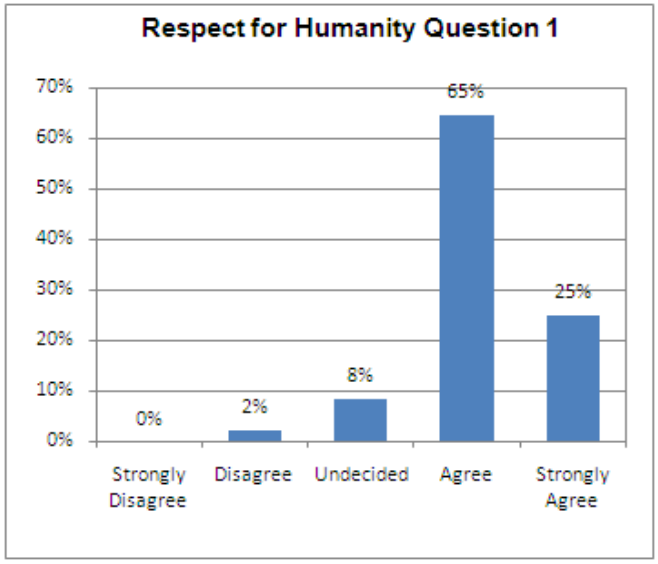


Figure 38: Distribution of responses for Respect for Humanity question 1

4.3.6.2 Management's respect for me encourages me to contribute to the Lean implementation

It can be seen from Figure 39 that 50% and 19% of the respondents agree and strongly agree respectively whilst 23% of the respondents are undecided. 4% of respondents disagreed and 4% strongly disagreed with the above statement. The analysis also shows that cumulatively, 69% of the respondents positively agreed with the above statement whilst 8% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

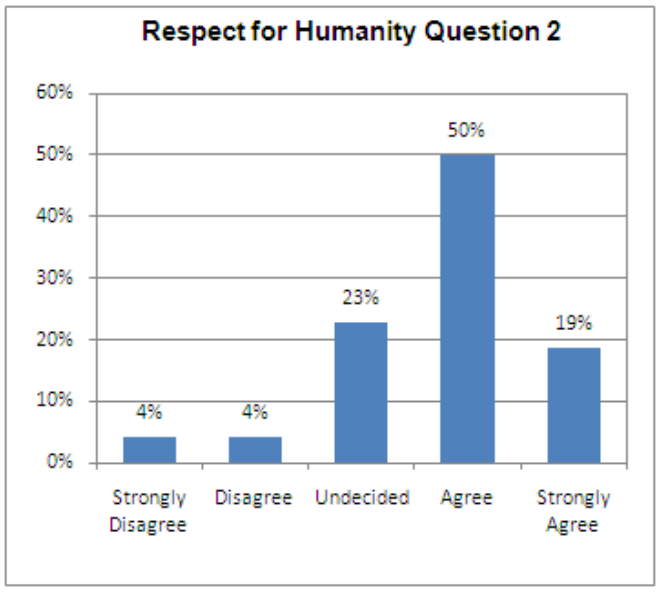


Figure 39: Distribution of responses for Respect for Humanity question 2

4.3.6.3 The staff within my work area is respected for their input and suggestions towards Lean in order to improve their work area

It can be seen from Figure 40 that 63% and 13% of the respondents agree and strongly agree respectively whilst 23% of the respondents are undecided. Only 2% of respondents disagreed with the above statement. It is strongly depicted that cumulatively, 76% of the respondents positively agreed with the above statement whilst 2% of the respondents negatively agreed with the above statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

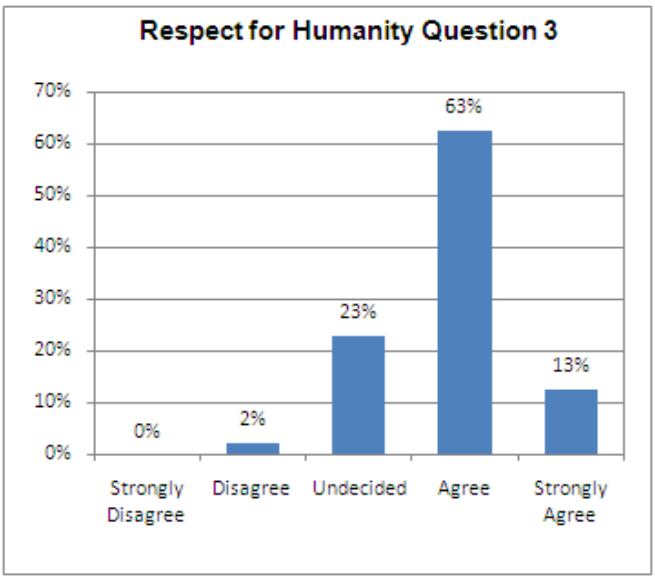


Figure 40: Distribution of responses for Respect for Humanity question 3

4.3.6.4 Staff within my area shows respect and commitment towards management's decisions concerning Lean implementation

It can be seen from Figure 41 that 38% and 4% of the respondents agree and strongly agree respectively whilst the majority of the respondents (48%) are undecided. 8% of respondents disagreed and 2% strongly disagreed with the above statement. The analysis also shows that cumulatively, 42% of the respondents positively agreed with the above statement whilst 10% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 3, as shown in Appendix G, which illustrates that most respondents was undecided in terms of the above statement.

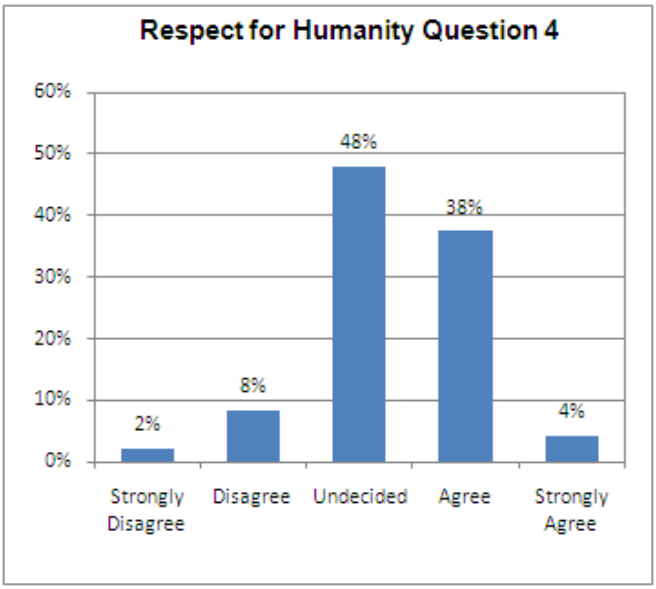


Figure 41: Distribution of responses for Respect for Humanity question 4

4.3.6.5 Management is committed towards creating an environment of respect, trust and openness which encourages me to contribute towards the Lean implementation

It can be seen from Figure 42 that 52% and 6% of the respondents agree and strongly agree respectively whilst 29% of the respondents are undecided. 8% of respondents disagreed and 4% strongly disagreed with the above statement. The analysis also shows that cumulatively, 58% of the respondents positively agreed with the above statement whilst 12% of the respondents negatively agreed with the statement as indicated in Appendix F. The mode for this question was calculated to be 4, as shown in Appendix G, which illustrates that most respondents agreed with the above statement.

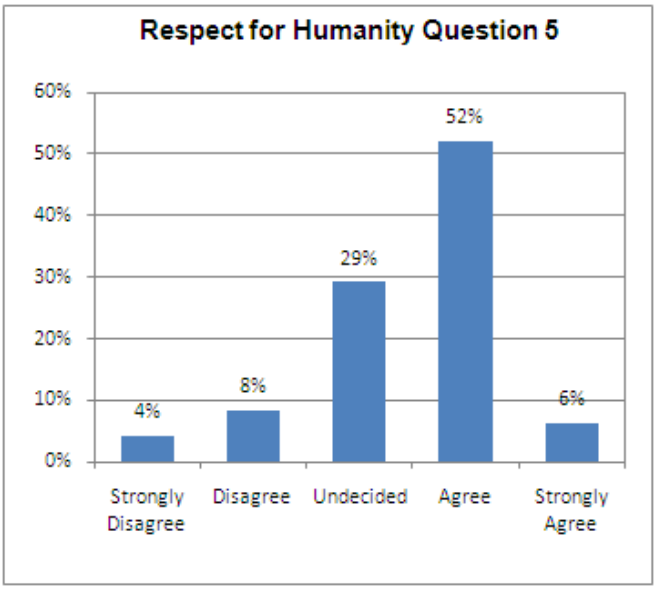


Figure 42: Distribution of responses for Respect for Humanity question 5

It can be seen from the frequency distributions in Table 13 below that there is a positive pattern that more of the participants agree with the statements related to Respect for humanity in terms of Lean implementation. The analysis also shows that 48% of the participants responded as undecided to question 5. Respect for humanity would be an important metric that should be included as part of the balanced scorecard on the learning perspectives quadrant.

Table 13: Variable Frequencies for Questions related to Respect for Humanity

Repect for Humanity Q1	0%	2%	8%	65%	25%
Repect for Humanity Q2	4%	4%	23%	50%	19%
Repect for Humanity Q3	0%	2%	23%	63%	13%
Repect for Humanity Q4	2%	8%	48%	38%	4%
Repect for Humanity Q5	4%	8%	29%	52%	6%

4.4 Comparing demographic groupings and the background variables

4.4.1 Relationship between Coach Business and each of the variables Training, Job Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity

The generic null hypothesis, H_o, is the means of the Coach business locations are the same in terms of each of the variables training, job roles and responsibilities, job empowerment, job multi-skilling, communication and respect for humanity whilst the alternate hypothesis is the means of the Coach Business groups differ from one another.

The Kruskal-Wallis one way ANOVA test is used to test for a relationship between location of Coach Business and each of the variables (Training, Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity). This test is appropriate since more than two groups (Salt River, Koedoespoort, Bloemfontein and Durban) are being compared. The Cramer's V test is used to test the association between location of Coach Business and each of the variables (Training, Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity). The results of the Kruskal-Wallis one way ANOVA test and Cramer's V test for association are shown in Tables H1-H6 in Appendix H.

The mean rank is the sum of the ranks for each group, divided by the number of cases. The closeness of the ranks between the 2 groups is an indication that there is little difference between the means of the 2 groups.

In terms of the questions posed per variable, focus was placed on key questions that the researcher deemed was necessary for the development of the balanced scorecard.

The questions of focus under Training were Q1 and Q5. The null hypothesis, H_o, is rejected for Training Q1 since the p-value is 0.039 (p-value < 0.05) and is NOT rejected for Training Q5 since the p-value is 0.767 (p-value > 0.05). Analysing the mean ranks for Training Q1 shows us that Salt River coach business remains undecided on this question whilst the other businesses support the statement that "*Their knowledge on Lean has improved following the Lean training intervention.*" Using Cramer's V, the association between the Coach Business and Training Q1 is weak with a value of 0.298. Similarly, the

association between Coach Business and Training Q5 is weak with a value of 0.266.

The questions of focus under Roles & Responsibilities were Q2 and Q5. The null hypothesis, H_o, is NOT rejected for both Roles & Responsibilities Q2 and Q5 since the p-values are 0.522 (p-value > 0.05) and 0.560 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that all coach businesses support these two statements in terms of job roles & responsibilities. Using Cramer's V, the association between the Coach Business and Roles & Responsibilities Q2 is weak with a value of 0.260. Similarly, the association between Coach Business and Roles & Responsibilities Q5 is weak with a value of 0.228.

The questions of focus under Empowerment were Q1 and Q4. The null hypothesis, H_o, is NOT rejected for both Empowerment Q1 and Q4 since the p-values are 0.547 (p-value > 0.05) and 0.354 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that all coach businesses support these two statements in terms of job empowerment. Using Cramer's V, the association between the Coach Business and Empowerment Q1 is weak with a value of 0.286. Similarly, the association between Coach Business and Empowerment Q4 is weak with a value of 0.280.

The questions of focus under Multi-skilling were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for Multi-skilling Q1 since the p-value is 0.268 (p-value > 0.05) and is rejected for Multi-skilling Q5 since the p-value is 0.005 (p-value < 0.05). Analysing the mean ranks for Multi-skilling Q5 shows us that both Durban and Salt River coach businesses disagrees with this statement whilst Koedoespoort remains undecided on this question whilst Bloemfontein business supports the statement that "*Employees have shown more enthusiasm to the Lean initiative following the multi-skilling intervention.*" Using Cramer's V, the association between the Coach Business and Multi-skilling Q1 is weak with a value of 0.270. Similarly, the association between Coach Business and Multi-skilling Q5 is moderate with a value of 0.431.

The questions of focus under Communication were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Communication Q1 and Q5 since the p-values are 0.208 (p-value > 0.05) and 0.503 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that all coach businesses support these two statements in terms of communication. Using Cramer's V, the association between the Coach Business and Communication Q1 is weak with a value of 0.233. Similarly, the association between Coach Business and Communication Q5 is weak with a value of 0.266.

The questions of focus under Respect for Humanity were Q1 and Q3. The null hypothesis, H_o, is NOT rejected for both Respect for Humanity Q1 and Q3 since the p-values are 0.528 (p-value > 0.05) and 0.598 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that all coach businesses support these two statements in terms of respect for humanity. Using Cramer's V, the association between the Coach Business and Respect for Humanity Q1 is weak with a value of 0.277. Similarly, the association between Coach Business and Respect for Humanity Q3 is weak with a value of 0.203.

4.4.2 Relationship between Job Level and each of the variables Training, Job Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity

The generic null hypothesis, H_o, is the means each of the Job Level is the same in terms of each of the variables training, job roles and responsibilities, job empowerment, job multi-skilling, communication and respect for humanity whilst the alternate hypothesis is the means of the job level groups differ from one another.

The Kruskal-Wallis one way ANOVA test is used to test for a relationship between Job Level and each of the variables. This test is appropriate since more than two groups (Supervisor, Middle Manager, and Senior Manager) are being compared. The Cramer's V test is used to test the association between

the Job Level and each of the variables (Training, Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity).The results of the Kruskal-Wallis one way ANOVA test and Cramer's V test for association are shown in Tables H7-H12 in Appendix H.

The mean rank is the sum of the ranks for each group divided by the number of cases. The closeness of the ranks between the 2 groups is an indication that there is little difference between the means of the 2 groups.

In terms of the questions posed per variable, focus was placed on key questions that the researcher deemed was necessary for the development of the balanced scorecard.

The questions of focus under Training were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Training Q1 and Q5 since the p-values are 0.096 (p-value > 0.05) and 0.174 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that the senior managers, middle managers and supervisors support these two statements in terms of Lean training. Using Cramer's V, the association between the Job Level and Training Q1 is moderate with a value of 0.390. Similarly, the association between Job Level and Training Q5 is weak with a value of 0.254.

The questions of focus under Roles & Responsibilities were Q2 and Q5. The null hypothesis, H_o, is NOT rejected for both Roles & Responsibilities Q2 and Q5 since the p-values are 0.190 (p-value > 0.05) and 0.395 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that the senior managers, middle managers and supervisors support these two statements in terms of job roles & responsibilities. Using Cramer's V, the association between the Job Level and Roles & Responsibilities Q2 is weak with a value of 0.211. Similarly, the association between Job Level and Roles & Responsibilities Q5 is weak with a value of 0.247.

The questions of focus under Empowerment were Q1 and Q4. The null hypothesis, H_o, is NOT rejected for both Empowerment Q1 and Q4 since the

p-values are 0.695 (p-value > 0.05) and 0.352 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that the senior managers, middle managers and supervisors support these two statements in terms of job empowerment. Using Cramer's V, the association between the Job Level and Empowerment Q1 is weak with a value of 0.207. Similarly, the association between Job Level and Empowerment Q4 is moderate with a value of 0.383.

The questions of focus under Multi-skilling were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Multi-skilling were Q1 and Q5 since the p-values are 0.400 (p-value > 0.05) and 0.888 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that the senior managers, middle managers and supervisors support these two statements in terms of job multi-skilling. Using Cramer's V, the association between the Job Level and Multi-skilling Q1 is weak with a value of 0.246. Similarly, the association between Job Level and Multi-skilling Q5 is moderate with a value of 0.357.

The questions of focus under Communication were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Communication Q1 and Q5 since the p-values are 0.295 (p-value > 0.05) and 0.211 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that the senior managers, middle managers and supervisors support these two statements in terms of communication. Using Cramer's V, the association between the Job Level and Communication Q1 is weak with a value of 0.184. Similarly, the association between Job Level and Communication Q5 is weak with a value of 0.264.

The questions of focus under Respect for Humanity were Q1 and Q3. The null hypothesis, H_o, is NOT rejected for both Respect for Humanity Q1 and Q3 since the p-values are 0.088 (p-value > 0.05) and 0.191 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that the senior managers, middle managers and supervisors support these two statements in terms of respect for humanity. Using Cramer's V, the

association between the Job Level and Respect for Humanity Q1 is weak with a value of 0.235. Similarly, the association between Job Level and Respect for Humanity Q3 is weak with a value of 0.270.

4.4.3 Relationship between Race and each of the variables Training, Job Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity

The generic null hypothesis, Ho, is the means each of the race groups is the same in terms of each of the variables training, job roles and responsibilities, job empowerment, job multi-skilling, communication and respect for humanity whilst the alternate hypothesis is the means of the race groups differ from one another.

The Kruskal-Wallis one way ANOVA test is used to test for a relationship between the Race and each of the variables (Training, Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity). This test is appropriate since more than two groups (White, Black, Coloured and Indian) are being compared. The Cramer's V test is used to test the association between location of Coach Business and each of the variables (Training, Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity). The results of the Kruskal-Wallis one way ANOVA test and Cramer's V test for association are shown in Tables H13-H18 in Appendix H.

The mean rank is the sum of the ranks for each group divided by the number of cases. The closeness of the ranks between the 2 groups is an indication that there is little difference between the means of the 2 groups.

In terms of the questions posed per variable, focus was placed on key questions that the researcher deemed was necessary for the development of the balanced scorecard.
The questions of focus under Training were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Training Q1 and Q5 since the p-values are 0.213

(p-value > 0.05) and 0.476 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that all races support these two statements in terms of Lean training. Using Cramer's V, the association between the Race and Training Q1 is moderate with a value of 0.367. Similarly, the association between Race and Training Q5 is weak with a value of 0.244.

The questions of focus under Roles & Responsibilities were Q2 and Q5. The null hypothesis, H_o, is NOT rejected for both Roles & Responsibilities Q2 and Q5 since the p-values are 0.219 (p-value > 0.05) and 0.407 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that races support these two statements in terms of job roles & responsibilities. Using Cramer's V, the association between the Race and Roles & Responsibilities Q2 is weak with a value of 0.241. Similarly, the association between Race and Roles & Responsibilities Q5 is weak with a value of 0.262.

The questions of focus under Empowerment were Q1 and Q4. The null hypothesis, H_o, is NOT rejected for both Empowerment Q1 and Q4 since the p-values are 0.121 (p-value > 0.05) and 0.063 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that all races support these two statements in terms of job empowerment. Using Cramer's V, the association between the Race and Empowerment Q1 is weak with a value of 0.241. Similarly, the association between Race and Empowerment Q4 is weak with a value of 0.282.

The questions of focus under Multi-skilling were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for Multi-skilling Q1 since the p-value is 0.777 (p-value > 0.05) and is rejected for Multi-skilling Q5 since the p-value is 0.042 (p-value < 0.05). Analysing the mean ranks for Multi-skilling Q5 shows us that a higher percentage of the white race group disagree whilst the Black and Coloured race groups largely remain undecided on the statement that "*Employees have shown more enthusiasm to the Lean initiative following the multi-skilling intervention.*" Using Cramer's V, the association between the

Race and Multi-skilling Q1 is weak with a value of 0.176. Similarly, the association between Race and Multi-skilling Q5 is weak with a value of 0.299.

The questions of focus under Communication were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Communication Q1 and Q5 since the p-values are 0.678 (p-value > 0.05) and 0.293 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that all races support these two statements in terms of communication. Using Cramer's V, the association between the Race and Communication Q1 is weak with a value of 0.165. Similarly, the association between Race and Communication Q5 is weak with a value of 0.269.

The questions of focus under Respect for Humanity were Q1 and Q3. The null hypothesis, H_o, is NOT rejected for both Respect for Humanity Q1 and Q3 since the p-values are 0.523 (p-value > 0.05) and 0.847 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that all races support these two statements in terms of respect for humanity. Using Cramer's V, the association between the Race and Respect for Humanity Q1 is weak with a value of 0.233. Similarly, the association between Race and Respect for Humanity Q3 is weak with a value of 0.183.

4.4.4 Relationship between Gender and each of the variables Training, Job Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity

The generic null hypothesis, Ho, is the means each of the gender is the same in terms of each of the variables training, job roles and responsibilities, job empowerment, job multi-skilling, communication and respect for humanity whilst the alternate hypothesis is the means of the gender groups differ from one another.

The Mann-Whitney *U* test is used to test for a relationship between gender and each of the variables (Training, Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity).

This test is appropriate since two groups (male and female) are being compared. The Cramer's V test is used to test the association between location of Coach Business and each of the variables (Training, Roles and Responsibilities, Job Empowerment, Job Multi-skilling, Communication and Respect for Humanity). The results of the Mann-Whitney *U* test and Cramer's V test for association are shown in Tables H19-H24 in Appendix H.

The mean rank is the sum of the ranks for each group divided by the number of cases. The closeness of the ranks between the 2 groups is an indication that there is little difference between the means of the 2 groups.

In terms of the questions posed per variable, focus was placed on key questions that the researcher deemed was necessary for the development of the balanced scorecard.

The questions of focus under Training were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Training Q1 and Q5 since the p-values are 0.242 (p-value > 0.05) and 0.749 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that both males and females support these two statements in terms of Lean training. Using Cramer's V, the association between the Gender and Training Q1 is weak with a value of 0.183. Similarly, the association between Gender and Training Q5 is weak with a value of 0.248.

The questions of focus under Roles & Responsibilities were Q2 and Q5. The null hypothesis, H_o, is rejected for Roles & Responsibilities Q2 since the p-value is 0.002 (p-value < 0.05) and is NOT rejected for Roles & Responsibilities Q5 since the p-value is 0.371 (p-value > 0.05). Analysing the mean ranks for Roles & Responsibilities Q2 shows us that the female gender group show more support for the statement "*My new role and responsibilities has helped me to implement Lean within my work area"* as compared to males. The analysis shows that both groups show support for the above statement. Using Cramer's V, the association between the Gender and Roles & Responsibilities Q2 is moderate with a value of 0.480. Similarly, the

association between Gender and Roles & Responsibilities Q5 is weak with a value of 0.225.

The questions of focus under Empowerment were Q1 and Q4. The null hypothesis, H_o, is rejected for Empowerment Q1 since the p-value is 0.038 (p-value < 0.05) and is NOT rejected for Empowerment Q4 since the p-value is 0.192 (p-value > 0.05). Analysing the mean ranks for Empowerment Q1 shows us that the female gender group show more support for the statement "*Employee empowerment is important for a successful Lean implementation"* as compared to males. The analysis shows that both groups show strong support for the above statement. Using Cramer's V, the association between the Gender and Empowerment Q1 is weak with a value of 0.303. Similarly, the association between Gender and Empowerment Q4 is weak with a value of 0.199.

The questions of focus under Multi-skilling were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Multi-skilling Q1 and Q5 since the p-values are 0.298 (p-value > 0.05) and 0.244 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that both males and females support these two statements in terms of job multi-skilling. Using Cramer's V, the association between the Gender and Multi-skilling Q1 is weak with a value of 0.184. Similarly, the association between Gender and Multi-skilling Q5 is moderate with a value of 0.441.

The questions of focus under Communication were Q1 and Q5. The null hypothesis, H_o, is NOT rejected for both Communication Q1 and Q5 since the p-values are 0.129 (p-value > 0.05) and 0.550 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that both males and females support these two statements in terms of communication. Using Cramer's V, the association between the Gender and Communication Q1 is weak with a value of 0.222. Similarly, the association between Gender and Communication Q5 is weak with a value of 0.186.

The questions of focus under Respect for Humanity were Q1 and Q3. The null hypothesis, H_o, is NOT rejected for both Respect for Humanity Q1 and Q3 since the p-values are 0.126 (p-value > 0.05) and 0.205 (p-value > 0.05) respectively. Analysing the mean ranks for these two questions shows us that both males and females support these two statements in terms of respect for humanity. Using Cramer's V, the association between the Gender and Respect for Humanity Q1 is weak with a value of 0.228. Similarly, the association between Gender and Respect for Humanity Q3 is weak with a value of 0.278.

4.5 Summary

This chapter conveyed the survey results in graphical form beginning with the demographic information followed by agreement measures. Descriptive and summary statistics were used to explore and present an initial "feel" for the data.

The Kruskal-Wallis one way ANOVA and Mann-Whitney U tests were used to test for relationships between characteristic input variables and the answers provided by the participants in terms of the six human factor elements. In terms of the questions that are deemed key to the development of the human capital balanced scorecard for lean implementation, the null hypothesis for Coach Business is supported by all variables except for the following variables: Training Q1 and Multi-skilling Q5. The null hypothesis for Job Level is supported by all variables. The null hypothesis for Race is supported by all variables except for the following variable: Multi-skilling Q5. The null hypothesis for Gender is supported by all variables except for the following variables: Roles & Responsibilities Q2 and Empowerment Q1.

Cramer's V test for association showed either weak to moderate relationships between the input variables (Training, Roles & Responsibilities, Empowerment, Multi-skilling, Communication and Respect for Humanity) and the question deemed to be key for the development of the human capital scorecard for lean implementation.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The goal of this research report was to present the findings of the investigation, communicate the recommendations and conclusion and suggest areas of further research. Therefore the first section of this chapter provides a summary of the research findings. This includes all the achievements accomplished by conducting this research. The second section of this chapter outlines the recommendations and conclusion. The aim in this section is to prove that the suggested recommendations and conclusion are logically derived from the analysis of the findings. The last section of this chapter is a list of suggestions for further research.

5.2 Summary of research findings

It is important to note that the research objectives of this study have been achieved. The body of knowledge has been enriched using the feedback received from the participants of the study. The main research problem was to develop a human capital scorecard for successful Lean implementation using the coach business as a case study.

The literature review conducted highlighted the following human capital factors as key to the successful implementation of Lean within a manufacturing environment:

- Training
- Roles & responsibilities
- Job multi-skilling
- Job empowerment
- Communication
- Respect for humanity

A survey research was conducted using the questionnaire constructed using the abovementioned human capital factors. The results of the survey strongly

supported the findings from the literature survey in terms of the human capital factors deemed to be important for a successful Lean implementation. Hypotheses testing have been utilised to illustrate that relationships do exist between the coach business location, job level, gender and race groups and each of the human capital factors.

Based on the finding of this study, a balanced scorecard, shown in Table 14, can be developed that incorporates the key human capital factors that can be used to measure and manage the implementation of Lean within an engineering environment.

Table 14: Human Capital Lean Scorecard

Customer perspective (Value-adding view)	**Financial perspective (Shareholders' view)**
Mission: to achieve our vision, by delivering value to our customers	Mission: to succeed financially, by delivering value to our shareholders
Internal perspective (Process-based view)	**Learning and growth perspective (Future view)**
▪ Development of effective Lean communication plan ▪ Review of the roles & responsibilities of each personnel that is conducive for a Lean environment. ▪ Appropriate decentralisation of decision-making to personnel on the shop floor so that they are empowered to take key decisions.	▪ Development of a Lean training plan for personnel. ▪ Rotation of personnel to improve their capability to multi-task within a Lean environment. ▪ Creating a Lean environment of trust, openness and respect for all personnel.

5.3 Conclusions

In conclusion it was observed from the survey research that the human capital factors for successful lean implementation are supported in terms of the survey conducted. It was also shown that relationships do exist between the participants' demographic and biographic variables and human capital factors. The consistency of unbiased evaluation (free of human error and emotion) was ensured.

It is therefore concluded that the human capital factors identified in the theory and tested in the case study are important factors that ensure a successful lean implementation in an engineering environment. Engineering companies that are considering implementing lean within their environment should include these factors in the balanced scorecard of the supervisors, middle managers and senior managers. Careful consideration and inclusion of these factors would ensure that individuals are measured accordingly in terms of lean implementation from a human factor perspective. This will provide a positive significant contribution to the success rate of the lean implementation within that specific environment.

5.4 Recommendations

After close examination and analysis of the research findings, the following recommendations are suggested. The recommendations are suggested based on the research hypotheses.

- the reasons for the 33% non-response should be established as this could provide further insight into the research,
- establish reasons for non representation of the Indian race group in the study,
- the research be expanded to the other business units within Transnet Rail Engineering which would make the sampling frame much larger and ensure generalisation of the results,
- Consideration should given to incorporating a balanced scorecard for personnel below the supervisor level as this is key to the successful implementation of lean at the coalface.

5.5 Suggestions for further research

The focus of this research was predominantly quantitative but consideration should be given to ascertain the qualitative aspects of lean implementation. Future research should focus on combining the qualitative and quantitative studies, mixed method design. Using unstructured interviews with open ended

question could elicit softer issues pertaining to lean implementation within their environment. The findings of the qualitative research would then be developed into hypotheses which would form the basis for the quantitative research.

Future research should also give serious consideration to including shop floor personnel in the sampling frame as these individuals are directly involved with Lean at the execution level. If buy-in is not achieved at this level then successful implementation would not be achievable as support from this level would be poor resulting in imminent failure.

Future research should also focus on specifically formulating the metrics that is to be used to measure the six factors that form part of the human capital lean scorecard.

Reliability and validity of the current work can be researched further. The accuracy, meaningfulness, and credibility of the research project could be enhanced through the use of triangulation. Data could be separately analysed from multiple sources.

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APPENDIX A: Schedule for Research Report

Item	Task Name	Duration	Start	Finish	
1	Source relevant literature	3 weeks	02/02/09	22/02/09	✓
2	**Post Research report title**	**1 day**	**28/02/09**	**28/02/09**	✓
3	Review literature	2 weeks	02/03/09	15/03/09	✓
4	Formulate research methodology	1 week	16/03/09	22/03/09	✓
5	Compile research proposal	1 week	23/03/09	30/03/09	✓
6	**Finalise & submit research proposal**	**1 day**	**31/03/09**	**31/03/09**	✓
7	TRE review research proposal	3 days	01/04/09	03/04/09	✓
8	**Submit interim report**	**1 day**	**01/06/09**	**01/06/09**	✓
9	Prepare draft questions for questionnaire	5 days	24/06/09	28/06/09	✓
10	Review & approval by TRE of questionnaire's for emailing purposes	2 days	29/06/09	30/06/09	✓
11	Email questionnaires	1 day	01/07/09	01/07/09	✓
12	Prepare interim report	2 weeks	10/08/09	23/08/09	✓
13	Review response rate and prompt non respondents to complete email	1 week	24/08/09	28/08/09	✓
14	Analyse questionnaires	1 week	02/11/09	08/11/09	✓
15	Review findings, formulate model and focus on conclusions	1 week	09/11/09	15/11/09	✓
16	Prepare final report	2 week	16/11/09	27/11/09	✓
17	Edit report and finalise	1 week	29/11/09	03/12/09	✓
18	**Submit research final report**	**1 day**	**04/12/09**	**04/12/09**	✓

APPENDIX B: Letter Requesting Permission from TRE to Conduct Research

C. Moopanar
22 Wren Grove, Village Park
Tongaat, 4400
25 June 2009

Sugen Govender
GM: Coaches TRE
311 Edwin Swales Drive
Rossborough

Sir

Re: Application for permission to conduct study

I, Collin Moopanar, an employee of TRE Coach Business (TBT224R) hereby request permission to conduct a study into understanding the perspectives of members of your esteemed organization with respect to the following research question:

The Development of a Human Capital Scorecard for Lean Implementation within an Engineering Environment – The Case of Transnet Coach Business.

This research in the form of a dissertation will be submitted to the University of Southern Africa's Business school as a partial fulfilment of the requirement for the degree of Master of Business Leadership.

This study aims to provide managers with a set of measurements that will form part of a balanced scorecard which can be used for the effective implementation of Lean Management. The developed framework will consist of elements found in literature and findings from your organisation. To successfully conduct this study permission is herby requested to interview selected members of TRE Coach Business. This will consist of 1 hour interviews held on site and approximately 60 interviews will be held over 3 weeks. The questionnaire that will be employed is attached for your perusal. In addition, observations will be made of documents and artefacts supporting the research will also be used. Permission to use any documentation will be obtained from your communications department

The findings and recommendations from this study will be presented to the management team of Transnet Rail Engineering.

Thanking you in advance for your contribution to this study.

Yours sincerely

_____
C. Moopanar

APPENDIX C: Formulation of Research Hypotheses

HUMAN FACTOR ELEMENTS/THEMES FOR LEAN IMPLEMENTATION

- Establishment of a long term philosophy for a lean enterprise. Formulating the vision to enable people to look creatively at what they do on a daily basis and do it better,
- Change management initiative in terms of fostering the right culture amongst employees to enable full benefits of lean. To create a problem solving culture where employees are committed to continuous improvement.
- Promotion of an environment whereby all stakeholders can share their ideas and receive feedback.
- Development of an environment of trust, openness and learning through communication and sharing of ideas with employees and trade unions.
- Effective and easy-to-use system for communication.
- Management commitment and involvement.
- Management respect for humanity.
- Fostering teamwork and improving leadership skills of employees.
- High degree of cross training and education of employees from upper management to the shop floor. Multi-skilling of employees.
- High level of employees' involvement and commitment from the initial planning phase.
- Full and clear understanding of the lean initiative and the potential outcomes.
- Empowerment of employees to make decisions, suggestions and to take actions thereby improving job autonomy.
- Commitment of employees to solve their own problems and generate new ways of doing their jobs.
- Change in terms of employee behaviour and thinking to successfully reduce waste at their work station and taking proactive actions to improve quality and workflow.
- Job rotation, sharing of responsibilities and multi-skilling of employees.
- Re-organising/re-evaluation of processes to facilitate lean initiative.
- Re-evaluation of job descriptions and a clear understanding of roles and responsibilities to suite the new processes that are required to support the lean initiative in the organisation.
- Delegation of traditional management activities to shop floor employees empowered with the necessary authority and capability (education and training) to plan, check and improve these activities (eliminate waste). Freedom to plan and to decide and the capability to take over this responsibility.
- Introductory lean training at all levels of supervisors and management before launching lean initiative organisation wide.

CRITICAL HUMAN FACTOR ELEMENTS/THEMES

- TRAINING
- JOB ROLES AND RESPONSIBILITIES
- JOB EMPOWERMENT
- JOB MULTISKILLING
- COMMUNICATION
- ENVIRONMENT OF RESPECT, TRUST & OPENESS

RESEARCH HYPOTHESES

1. Training is an important aspect of Lean implementation within Transnet Rail Engineering Coach Business.
2. Job roles and responsibilities are directly linked to the success of Lean implementation and management.
3. Empowerment and delegation of authority are both important aspects of Lean implementation within Transnet Rail Engineering Coach Business.
4. Multi-skilling of employees through education and cross training is important to support the Lean initiative within Transnet Rail Engineering Coach Business.
5. Communication through all levels of the organisation is an important aspect of Lean implementation within Transnet Rail Engineering Coach Business.
6. Respect, trust and openness within Transnet Rail Engineering Coach Business environment support the Lean implementation.

APPENDIX D: Research Questionnaire

HUMAN FACTOR LEAN IMPLEMENTATION EVALUATION

Dear Participant:

I am currently completing a study to evaluate the Human Factors that are deemed critical for the effective implementation of a Lean initiative within an organisation. The attached questionnaire forms part of my study to evaluate these factors and seeks to obtain research data to validate the impact of these factors in a typical implementation within Transnet Rail Engineering Coach Business. The study deals with several human factors that literature highlights as critical for the effective implementation of Lean within an organisation. It is expected that the knowledge generated will facilitate the development of a human factor scorecard that could be used to measure the implementation of the Lean initiative.

The questionnaire contains questions relating to lean implementation together with a biographic sheet. Your individual responses are confidential. All individual responses will aggregated to obtain an overall assessment. Your anonymity will be protected as the questionnaire does not ask for your business affiliation or your name.

Participation in this study is strictly voluntary but I do hope that you take the time to complete the questionnaire. If you have any concerns about the study, please contact Collin Moopanar, National Engineering Manager at Collin.Moopanar@transnet.net. If you are interested in getting a summary of the results of this survey once it is completed, please email at the above email address or hand in at the LBM secretary. I thank you for taking the time to complete this questionnaire.

BACKGROUND INFORMATION

1. Which Coach Business are you employed in?

Durban	1
Bloemfontein	2
Koedoespoort	3
Salt River	4

2. Which section within Coach Business are you part of? _____

3. What is your current level within the business?

Supervisor	1
Junior Manager	2
Senior Manager	3

4. What is your gender?

Male	1
Female	2

5. What is your race

Black	1
White	2
Coloured	3
Indian	4

Please comment by circling the number that best reflects your opinion of the following statements. Please use the following scale:

1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly agree

TRAINING					
1. My knowledge on lean has improved following the Lean training intervention.	1	2	3	4	5
2. The introductory Lean training has provided me with sufficient knowledge in order to implement the Lean initiative within my area.	1	2	3	4	5
3. I have been sufficiently trained in order to effectively train my staff to successfully implement the Lean initiative within my area.	1	2	3	4	5
4. The introductory Lean training has improved the staff's knowledge on Lean.	1	2	3	4	5
5. Lean training is important in order to successfully implement Lean within my area.	1	2	3	4	5
JOB ROLES AND RESPONSIBILITIES					
1. My previous roles and responsibilities was not appropriate for a Lean environment.	1	2	3	4	5
2. My new role and responsibilities has helped me to implement Lean within my work area.	1	2	3	4	5
3. The roles and responsibilities of my staff has had to change in order to implement Lean.	1	2	3	4	5
4. The staff has a clear understanding of their new roles and responsibilities to suite the new Lean processes.	1	2	3	4	5
5. A change in terms of the roles and responsibilities was necessary in order to successfully implement Lean.	1	2	3	4	5
JOB EMPOWERMENT					
1. Employee empowerment is important for a successful Lean implementation.	1	2	3	4	5
2. I have been appropriately empowered to make decisions and suggestions in order to improve my area of control.	1	2	3	4	5
3. The staff have been empowered to make decisions and suggestions in order to implement Lean.	1	2	3	4	5
4. I have been delegated with the appropriate authority to plan, check and improve my work activities.	1	2	3	4	5
5. I am committed to solving my own problems and generating new ways to do my jobs more effectively.	1	2	3	4	5

JOB MULTISKILLING					
1. Multi-skilling of employees is an important aspect of the Lean implementation.	1	2	3	4	5
2. I have been sufficiently educated and appropriately cross trained in order to multi-task across other areas to aid the Lean initiative.	1	2	3	4	5
3. The staff within my area have received appropriate education and cross training to enable them to multi-task.	1	2	3	4	5
4. The staff within my area are constantly rotated between different jobs functions in order to improve their capability to multi task.	1	2	3	4	5
5. Employees have shown more enthusiasm to the Lean initiative following the multi-skilling intervention.	1	2	3	4	5

COMMUNICATION					
1. Communication within my work area is an important aspect of Lean implementation.	1	2	3	4	5
2. The easy-to-use communication platform is in place for us to make suggestions or to raise concerns regarding Lean.	1	2	3	4	5
3. New initiatives concerning Lean processes and working environment are regularly communicated to us.	1	2	3	4	5
4. There is regular feedback from management on issues or suggestions concerning Lean that are raised by us.	1	2	3	4	5
5. Management encourages employees to communicate their suggestions and concerns.	1	2	3	4	5

RESPECT FOR HUMANITY					
1. Respect towards employees for their effort is an important aspect of Lean implementation.	1	2	3	4	5
2. Management's respect for me encourages me to contribute to the Lean implementation.	1	2	3	4	5
3. The staff within my work area is respected for their input and suggestions towards Lean in order to improve their work area.	1	2	3	4	5
4. Staff within my area shows respect and commitment towards management's decisions concerning Lean implementation.	1	2	3	4	5
5. Management is committed towards creating an environment of respect, trust and openness which encourages me to contribute towards the Lean implementation.	1	2	3	4	5

THANK YOU VERY MUCH FOR YOUR TIME AND FOR PARTICIPATING IN THIS SURVEY

APPENDIX E: Variable Frequencies

Table E1: Variable Frequencies

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Training Q1	0%	4%	25%	52%	19%
Training Q2	0%	10%	21%	56%	13%
Training Q3	2%	13%	31%	38%	17%
Training Q4	2%	8%	42%	40%	8%
Training Q5	4%	0%	10%	50%	35%
Roles & Responsibilities Q1	6%	25%	33%	33%	2%
Roles & Responsibilities Q2	2%	4%	21%	60%	13%
Roles & Responsibilities Q3	0%	19%	13%	54%	15%
Roles & Responsibilities Q4	2%	10%	46%	33%	8%
Roles & Responsibilities Q5	0%	6%	27%	50%	17%
Empowerment Q1	0%	0%	6%	52%	42%
Empowerment Q2	0%	4%	17%	56%	23%
Empowerment Q3	0%	2%	23%	56%	19%
Empowerment Q4	0%	2%	19%	69%	10%
Empowerment Q5	0%	0%	6%	56%	38%
Multiskilling Q1	0%	2%	8%	58%	31%
Multiskilling Q2	2%	8%	38%	42%	8%
Multiskilling Q3	2%	19%	48%	27%	4%
Multiskilling Q4	4%	19%	33%	35%	8%
Multiskilling Q5	10%	25%	35%	27%	2%
Communication Q1	0%	0%	4%	65%	31%
Communication Q2	2%	2%	25%	54%	17%
Communication Q3	0%	6%	21%	65%	8%
Communication Q4	4%	17%	25%	48%	6%
Communication Q5	2%	8%	15%	58%	17%
Repect for Humanity Q1	0%	2%	8%	65%	25%
Repect for Humanity Q2	4%	4%	23%	50%	19%
Repect for Humanity Q3	0%	2%	23%	63%	13%
Repect for Humanity Q4	2%	8%	48%	38%	4%
Repect for Humanity Q5	4%	8%	29%	52%	6%

APPENDIX F: Cumulative Variable Frequencies

Table F1: Cumulative Variable Frequencies

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Training Q1	0%	4%	25%	52%	19%
Cumulative	4%		25%	71%	
Training Q2	0%	10%	21%	56%	13%
Cumulative	10%		21%	69%	
Training Q3	2%	13%	31%	38%	17%
Cumulative	15%		31%	54%	
Training Q4	2%	8%	42%	40%	8%
Cumulative	10%		42%	48%	
Training Q5	4%	0%	10%	50%	35%
Cumulative	4%		10%	85%	
Roles & Responsibilities Q1	6%	25%	33%	33%	2%
Cumulative	31%		33%	35%	
Roles & Responsibilities Q2	2%	4%	21%	60%	13%
Cumulative	6%		21%	73%	
Roles & Responsibilities Q3	0%	19%	13%	54%	15%
Cumulative	19%		13%	69%	
Roles & Responsibilities Q4	2%	10%	46%	33%	8%
Cumulative	13%		46%	42%	
Roles & Responsibilities Q5	0%	6%	27%	50%	17%
Cumulative	6%		27%	67%	
Empowerment Q1	0%	0%	6%	52%	42%
Cumulative	0%		6%	94%	
Empowerment Q2	0%	4%	17%	56%	23%
Cumulative	4%		17%	79%	
Empowerment Q3	0%	2%	23%	56%	19%
Cumulative	2%		23%	75%	
Empowerment Q4	0%	2%	19%	69%	10%
Cumulative	2%		19%	79%	
Empowerment Q5	0%	0%	6%	56%	38%
Cumulative	0%		6%	94%	
Multiskilling Q1	0%	2%	8%	58%	31%
Cumulative	2%		8%	90%	
Multiskilling Q2	2%	8%	38%	42%	8%
Cumulative	10%		38%	50%	
Multiskilling Q3	2%	19%	48%	27%	4%
Cumulative	21%		48%	31%	
Multiskilling Q4	4%	19%	33%	35%	8%
Cumulative	23%		33%	44%	
Multiskilling Q5	10%	25%	35%	27%	2%
Cumulative	35%		35%	29%	
Communication Q1	0%	0%	4%	65%	31%
Cumulative	0%		4%	96%	
Communication Q2	2%	2%	25%	54%	17%
Cumulative	4%		25%	71%	
Communication Q3	0%	6%	21%	65%	8%
Cumulative	6%		21%	73%	
Communication Q4	4%	17%	25%	48%	6%
Cumulative	21%		25%	54%	
Communication Q5	2%	8%	15%	58%	17%
Cumulative	10%		15%	75%	
Repect for Humanity Q1	0%	2%	8%	65%	25%
Cumulative	2%		8%	90%	
Repect for Humanity Q2	4%	4%	23%	50%	19%
Cumulative	8%		23%	69%	
Repect for Humanity Q3	0%	2%	23%	63%	13%
Cumulative	2%		23%	75%	
Repect for Humanity Q4	2%	8%	48%	38%	4%
Cumulative	10%		48%	42%	
Repect for Humanity Q5	4%	8%	29%	52%	6%
Cumulative	13%		29%	58%	

APPENDIX G: Variable Modes

Table G1: Modes for the variables

	Mode
Training Q1	4
Training Q2	4
Training Q3	4
Training Q4	3
Training Q5	4
Roles & Responsibilities Q1	3
Roles & Responsibilities Q2	4
Roles & Responsibilities Q3	4
Roles & Responsibilities Q4	3
Roles & Responsibilities Q5	4
Empowerment Q1	4
Empowerment Q2	4
Empowerment Q3	4
Empowerment Q4	4
Empowerment Q5	4
Multiskilling Q1	4
Multiskilling Q2	4
Multiskilling Q3	3
Multiskilling Q4	4
Multiskilling Q5	3
Communication Q1	4
Communication Q2	4
Communication Q3	4
Communication Q4	4
Communication Q5	4
Repect for Humanity Q1	4
Repect for Humanity Q2	4
Repect for Humanity Q3	4
Repect for Humanity Q4	3
Repect for Humanity Q5	4

APPENDIX H: Statistical Analysis Results

Table H1: Grouping Variables: Coach Business and Training

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
TRAINING Q1	48	3.83	.781	2	5
TRAINING Q2	48	3.71	.824	2	5
TRAINING Q3	48	3.54	.988	1	5
TRAINING Q4	48	3.44	.848	1	5
TRAINING Q5	48	4.13	.914	1	5
Coach Business	48	2.56	1.128	1	4

Ranks

	Coach Business	N	Mean Rank
TRAINING Q1	1	11	23.95
	2	12	28.38
	3	12	29.92
	4	13	16.38
	Total	48	
TRAINING Q2	1	11	23.09
	2	12	29.25
	3	12	27.29
	4	13	18.73
	Total	48	
TRAINING Q3	1	11	22.95
	2	12	32.13
	3	12	22.58
	4	13	20.54
	Total	48	
TRAINING Q4	1	11	17.73
	2	12	29.38
	3	12	29.46
	4	13	21.15
	Total	48	
TRAINING Q5	1	11	24.32
	2	12	26.54
	3	12	25.83
	4	13	21.54
	Total	48	

Test Statistics [a]

	TRAINING Q1	TRAINING Q2	TRAINING Q3	TRAINING Q4	TRAINING Q5
Chi-Square	8.365	5.156	5.447	7.258	1.142
df	3	3	3	3	3
Asymp. Sig.	.039	.161	.142	.064	.767

a. Kruskal Wallis Test

Symmetric Measures

	TRAINING Q1	TRAINING Q2	TRAINING Q3	TRAINING Q4	TRAINING Q5
Cramer's V	.298	.277	.373	.575	.266

Table H2: Grouping Variables: Coach Business and Roles & Responsibilities

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
ROLES/RESPONSIBILTY Q1	48	3.00	.968	1	5
ROLES/RESPONSIBILITY Q2	48	3.77	.805	1	5
ROLES/RESPONSIBILITY Q3	48	3.65	.956	2	5
ROLES/RESPONSIBILTY Q4	48	3.35	.863	1	5
ROLES/RESPONSIBILTY Q5	48	3.77	.805	2	5
Coach Business	48	2.56	1.128	1	4

Ranks

	Coach Business	N	Mean Rank
ROLES/RESPONSIBILTY Q1	1	11	24.05
	2	12	24.79
	3	12	23.71
	4	13	25.35
	Total	48	
ROLES/RESPONSIBILITY Q2	1	11	24.27
	2	12	28.67
	3	12	23.92
	4	13	21.38
	Total	48	
ROLES/RESPONSIBILITY Q3	1	11	20.00
	2	12	28.00
	3	12	27.96
	4	13	21.88
	Total	48	
ROLES/RESPONSIBILTY Q4	1	11	24.91
	2	12	29.58
	3	12	25.50
	4	13	18.54
	Total	48	
ROLES/RESPONSIBILTY Q5	1	11	24.68
	2	12	27.88
	3	12	25.21
	4	13	20.58
	Total	48	

Test Statistics [a]

	ROLES/RESPONSIBILTY Q1	ROLES/RESPONSIBILITY Q2	ROLES/RESPONSIBILITY Q3	ROLES/RESPONSIBILTY Q4	ROLES/RESPONSIBILTY Q5
Chi-Square	.113	2.251	3.703	4.634	2.058
df	3	3	3	3	3
Asymp. Sig.	.990	.522	.295	.201	.560

a. Kruskal Wallis Test

Symmetric Measures

	ROLES/RESPONSIBILTY Q1	ROLES/RESPONSIBILITY Q2	ROLES/RESPONSIBILITY Q3	ROLES/RESPONSIBILTY Q4	ROLES/RESPONSIBILTY Q5
Cramer's V	.354	.260	.204	.324	.228

Table H3: Grouping Variables: Coach Business and Empowerment

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
EMPOWERMENT Q1	48	4.35	.601	3	5
EMPOWERMENT Q2	48	3.98	.758	2	5
EMPOWERMENT Q3	48	3.92	.710	2	5
EMPOWERMENT Q4	48	3.88	.606	2	5
EMPOWERMENT Q5	48	4.31	.589	3	5
Coach Business	48	2.56	1.128	1	4

Ranks

	Coach Business	N	Mean Rank
EMPOWERMENT Q1	1	11	27.00
	2	12	27.25
	3	12	23.04
	4	13	21.19
	Total	48	
EMPOWERMENT Q2	1	11	22.23
	2	12	27.00
	3	12	24.38
	4	13	24.23
	Total	48	
EMPOWERMENT Q3	1	11	22.45
	2	12	25.25
	3	12	27.25
	4	13	23.00
	Total	48	
EMPOWERMENT Q4	1	11	28.55
	2	12	23.50
	3	12	26.08
	4	13	20.54
	Total	48	
EMPOWERMENT Q5	1	11	25.86
	2	12	22.00
	3	12	26.38
	4	13	23.92
	Total	48	

Test Statistics [a]

	EMPOWERMENT Q1	EMPOWERMENT Q2	EMPOWERMENT Q3	EMPOWERMENT Q4	EMPOWERMENT Q5
Chi-Square	2.123	.842	1.097	3.257	.941
df	3	3	3	3	3
Asymp. Sig.	.547	.839	.778	.354	.815

a. Kruskal Wallis Test

Symmetric Measures

	EMPOWERMENT Q1	EMPOWERMENT Q2	EMPOWERMENT Q3	EMPOWERMENT Q4	EMPOWERMENT Q5
Cramer's V	.286	.182	.226	.280	.227

Table H4: Grouping Variables: Coach Business and Multi-skilling

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
MULTISKILLING Q1	48	4.19	.673	2	5
MULTISKILLING Q2	48	3.46	.849	1	5
MULTISKILLING Q3	48	3.13	.841	1	5
MULTISKILLING Q4	48	3.25	1.000	1	5
MULTISKILLING Q5	48	2.85	1.010	1	5
Coach Business	48	2.56	1.128	1	4

Ranks

	Coach Business	N	Mean Rank
MULTISKILLING Q1	1	11	21.95
	2	12	23.54
	3	12	30.50
	4	13	22.00
	Total	48	
MULTISKILLING Q2	1	11	23.18
	2	12	24.79
	3	12	31.63
	4	13	18.77
	Total	48	
MULTISKILLING Q3	1	11	29.41
	2	12	25.33
	3	12	27.13
	4	13	17.15
	Total	48	
MULTISKILLING Q4	1	11	23.23
	2	12	31.75
	3	12	25.04
	4	13	18.38
	Total	48	
MULTISKILLING Q5	1	11	19.27
	2	12	36.00
	3	12	24.04
	4	13	18.73
	Total	48	

Test Statistics [a]

	MULTISKILLING Q1	MULTISKILLING Q2	MULTISKILLING Q3	MULTISKILLING Q4	MULTISKILLING Q5
Chi-Square	3.942	6.231	6.247	6.370	12.891
df	3	3	3	3	3
Asymp. Sig.	.268	.101	.100	.095	.005

a. Kruskal Wallis Test

Symmetric Measures

	MULTISKILLING Q1	MULTISKILLING Q2	MULTISKILLING Q3	MULTISKILLING Q4	MULTISKILLING Q5
Cramer's V	.270	.312	.349	.317	.431

Table H5: Grouping Variables: Coach Business and Communication

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
COMMUNICATION Q1	48	4.27	.536	3	5
COMMUNICATION Q2	48	3.81	.816	1	5
COMMUNICATION Q3	48	3.75	.700	2	5
COMMUNICATION Q4	48	3.35	.978	1	5
COMMUNICATION Q5	48	3.79	.898	1	5
Coach Business	48	2.56	1.128	1	4

Ranks

	Coach Business	N	Mean Rank
COMMUNICATION Q1	1	11	26.36
	2	12	22.38
	3	12	29.50
	4	13	20.27
	Total	48	
COMMUNICATION Q2	1	11	25.59
	2	12	28.42
	3	12	26.54
	4	13	18.08
	Total	48	
COMMUNICATION Q3	1	11	24.68
	2	12	25.33
	3	12	28.50
	4	13	19.88
	Total	48	
COMMUNICATION Q4	1	11	19.23
	2	12	30.96
	3	12	30.71
	4	13	17.27
	Total	48	
COMMUNICATION Q5	1	11	24.45
	2	12	27.46
	3	12	26.13
	4	13	20.31
	Total	48	

Test Statistics [a]

	COMMUNICATION Q1	COMMUNICATION Q2	COMMUNICATION Q3	COMMUNICATION Q4	COMMUNICATION Q5
Chi-Square	4.554	4.868	3.379	11.430	2.348
df	3	3	3	3	3
Asymp. Sig.	.208	.182	.337	.010	.503

a. Kruskal Wallis Test

Symmetric Measures

	COMMUNICATION Q1	COMMUNICATION Q2	COMMUNICATION Q3	COMMUNICATION Q4	COMMUNICATION Q5
Cramer's V	.233	.318	.236	.402	.266

Table H6: Grouping Variables: Coach Business and Respect for Humanity

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
RESPECT Q1	48	4.13	.640	2	5
RESPECT Q2	48	3.75	.957	1	5
RESPECT Q3	48	3.85	.652	2	5
RESPECT Q4	48	3.33	.781	1	5
RESPECT Q5	48	3.48	.899	1	5
Coach Business	48	2.56	1.128	1	4

Ranks

	Coach Business	N	Mean Rank
RESPECT Q1	1	11	21.36
	2	12	28.50
	3	12	23.58
	4	13	24.31
	Total	48	
RESPECT Q2	1	11	27.32
	2	12	25.08
	3	12	28.00
	4	13	18.35
	Total	48	
RESPECT Q3	1	11	23.55
	2	12	23.38
	3	12	28.58
	4	13	22.58
	Total	48	
RESPECT Q4	1	11	21.36
	2	12	26.96
	3	12	28.46
	4	13	21.23
	Total	48	
RESPECT Q5	1	11	23.32
	2	12	25.92
	3	12	26.21
	4	13	22.62
	Total	48	

Test Statistics [a]

	RESPECT Q1	RESPECT Q2	RESPECT Q3	RESPECT Q4	RESPECT Q5
Chi-Square	2.218	4.352	1.879	3.095	.739
df	3	3	3	3	3
Asymp. Sig.	.528	.226	.598	.377	.864

a. Kruskal Wallis Test

Symmetric Measures

	RESPECT Q1	RESPECT Q2	RESPECT Q3	RESPECT Q4	RESPECT Q5
Cramer's V	.277	.294	.203	.251	.246

Table H7: Grouping Variable: Job Level and Training

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
TRAINING Q1	48	3.83	.781	2	5
TRAINING Q2	48	3.71	.824	2	5
TRAINING Q3	48	3.54	.988	1	5
TRAINING Q4	48	3.44	.848	1	5
TRAINING Q5	48	4.13	.914	1	5
JobLevel	48	1.48	.684	1	3

Ranks

	JobLevel	N	Mean Rank
TRAINING Q1	1	30	21.38
	2	13	29.42
	3	5	30.40
	Total	48	
TRAINING Q2	1	30	21.22
	2	13	27.81
	3	5	35.60
	Total	48	
TRAINING Q3	1	30	21.78
	2	13	29.15
	3	5	28.70
	Total	48	
TRAINING Q4	1	30	23.03
	2	13	28.35
	3	5	23.30
	Total	48	
TRAINING Q5	1	30	21.83
	2	13	28.96
	3	5	28.90
	Total	48	

Test Statistics [a]

	TRAINING Q1	TRAINING Q2	TRAINING Q3	TRAINING Q4	TRAINING Q5
Chi-Square	4.691	6.811	3.312	1.558	3.498
df	2	2	2	2	2
Asymp. Sig.	.096	.033	.191	.459	.174

a. Kruskal Wallis Test

Symmetric Measures

	TRAINING Q1	TRAINING Q2	TRAINING Q3	TRAINING Q4	TRAINING Q5
Cramer's V	.390	.372	.287	.189	.254

Table H8: Grouping Variable: Job Level and Roles & Responsibilities

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
ROLES/RESPONSIBILTY Q1	48	3.00	.968	1	5
ROLES/RESPONSIBILTY Q2	48	3.77	.805	1	5
ROLES/RESPONSIBILTY Q3	48	3.65	.956	2	5
ROLES/RESPONSIBILTY Q4	48	3.35	.863	1	5
ROLES/RESPONSIBILTY Q5	48	3.77	.805	2	5
JobLevel	48	1.48	.684	1	3

Ranks

	JobLevel	N	Mean Rank
ROLES/RESPONSIBILTY Q1	1	30	28.38
	2	13	19.08
	3	5	15.30
	Total	48	
ROLES/RESPONSIBILTY Q2	1	30	22.02
	2	13	29.04
	3	5	27.60
	Total	48	
ROLES/RESPONSIBILTY Q3	1	30	25.18
	2	13	23.73
	3	5	22.40
	Total	48	
ROLES/RESPONSIBILTY Q4	1	30	22.15
	2	13	28.50
	3	5	28.20
	Total	48	
ROLES/RESPONSIBILTY Q5	1	30	24.12
	2	13	22.62
	3	5	31.70
	Total	48	

Test Statistics[a]

	ROLES/RESPONSIBILTY Q1	ROLES/RESPONSIBILITY Q2	ROLES/RESPONSIBILITY Q3	ROLES/RESPONSIBILTY Q4	ROLES/RESPONSIBILTY Q5
Chi-Square	7.049	3.324	.269	2.607	1.858
df	2	2	2	2	2
Asymp. Sig.	.029	.190	.874	.272	.395

a. Kruskal Wallis Test

Symmetric Measures

	ROLES/RESPONSIBILTY Q1	ROLES/RESPONSIBILITY Q2	ROLES/RESPONSIBILITY Q3	ROLES/RESPONSIBILTY Q4	ROLES/RESPONSIBILTY Q5
Cramer's V	.421	.211	.203	.240	.247

Table H9: Grouping Variable: Job Level and Empowerment

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
EMPOWERMENT Q1	48	4.35	.601	3	5
EMPOWERMENT Q2	48	3.98	.758	2	5
EMPOWERMENT Q3	48	3.92	.710	2	5
EMPOWERMENT Q4	48	3.88	.606	2	5
EMPOWERMENT Q5	48	4.31	.589	3	5
JobLevel	48	1.48	.684	1	3

Ranks

	JobLevel	N	Mean Rank
EMPOWERMENT Q1	1	30	23.32
	2	13	26.38
	3	5	26.70
	Total	48	
EMPOWERMENT Q2	1	30	22.75
	2	13	27.15
	3	5	28.10
	Total	48	
EMPOWERMENT Q3	1	30	23.10
	2	13	25.85
	3	5	29.40
	Total	48	
EMPOWERMENT Q4	1	30	22.73
	2	13	28.15
	3	5	25.60
	Total	48	
EMPOWERMENT Q5	1	30	25.75
	2	13	22.77
	3	5	21.50
	Total	48	

Test Statistics [a]

	EMPOWERMENT Q1	EMPOWERMENT Q2	EMPOWERMENT Q3	EMPOWERMENT Q4	EMPOWERMENT Q5
Chi-Square	.729	1.572	1.285	2.088	.868
df	2	2	2	2	2
Asymp. Sig.	.695	.456	.526	.352	.648

a. Kruskal Wallis Test

Symmetric Measures

	EMPOWERMENT Q1	EMPOWERMENT Q2	EMPOWERMENT Q3	EMPOWERMENT Q4	EMPOWERMENT Q5
Cramer's V	.207	.179	.181	.383	.143

Table H10: Grouping Variable: Job Level and Multi-skilling

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
MULTISKILLING Q1	48	4.19	.673	2	5
MULTISKILLING Q2	48	3.46	.849	1	5
MULTISKILLING Q3	48	3.13	.841	1	5
MULTISKILLING Q4	48	3.25	1.000	1	5
MULTISKILLING Q5	48	2.85	1.010	1	5
JobLevel	48	1.48	.684	1	3

Ranks

	JobLevel	N	Mean Rank
MULTISKILLING Q1	1	30	25.52
	2	13	20.77
	3	5	28.10
	Total	48	
MULTISKILLING Q2	1	30	22.22
	2	13	25.58
	3	5	35.40
	Total	48	
MULTISKILLING Q3	1	30	24.10
	2	13	23.62
	3	5	29.20
	Total	48	
MULTISKILLING Q4	1	30	27.70
	2	13	15.38
	3	5	29.00
	Total	48	
MULTISKILLING Q5	1	30	23.78
	2	13	25.50
	3	5	26.20
	Total	48	

Test Statistics [a]

	MULTISKILLING Q1	MULTISKILLING Q2	MULTISKILLING Q3	MULTISKILLING Q4	MULTISKILLING Q5
Chi-Square	1.832	4.516	.741	8.331	.238
df	2	2	2	2	2
Asymp. Sig.	.400	.105	.690	.016	.888

a. Kruskal Wallis Test

Symmetric Measures

	MULTISKILLING Q1	MULTISKILLING Q2	MULTISKILLING Q3	MULTISKILLING Q4	MULTISKILLING Q5
Cramer's V	.246	.359	.323	.367	.357

Table H11: Grouping Variable: Job Level and Communication

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
COMMUNICATION Q1	48	4.27	.536	3	5
COMMUNICATION Q2	48	3.81	.816	1	5
COMMUNICATION Q3	48	3.75	.700	2	5
COMMUNICATION Q4	48	3.35	.978	1	5
COMMUNICATION Q5	48	3.79	.898	1	5
JobLevel	48	1.48	.684	1	3

Ranks

	JobLevel	N	Mean Rank
COMMUNICATION Q1	1	30	23.03
	2	13	25.08
	3	5	31.80
	Total	48	
COMMUNICATION Q2	1	30	24.38
	2	13	23.77
	3	5	27.10
	Total	48	
COMMUNICATION Q3	1	30	25.95
	2	13	21.73
	3	5	23.00
	Total	48	
COMMUNICATION Q4	1	30	21.62
	2	13	28.85
	3	5	30.50
	Total	48	
COMMUNICATION Q5	1	30	22.08
	2	13	27.92
	3	5	30.10
	Total	48	

Test Statistics [a]

	COMMUNICATION Q1	COMMUNICATION Q2	COMMUNICATION Q3	COMMUNICATION Q4	COMMUNICATION Q5
Chi-Square	2.443	.256	1.231	3.959	3.114
df	2	2	2	2	2
Asymp. Sig.	.295	.880	.540	.138	.211

a. Kruskal Wallis Test

Symmetric Measures

	COMMUNICATION Q1	COMMUNICATION Q2	COMMUNICATION Q3	COMMUNICATION Q4	COMMUNICATION Q5
Cramer's V	.184	.190	.325	.256	.264

Table H12: Grouping Variable: Job Level and Respect for Humanity

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
RESPECT Q1	48	4.13	.640	2	5
RESPECT Q2	48	3.75	.957	1	5
RESPECT Q3	48	3.85	.652	2	5
RESPECT Q4	48	3.33	.781	1	5
RESPECT Q5	48	3.48	.899	1	5
JobLevel	48	1.48	.684	1	3

Ranks

	JobLevel	N	Mean Rank
RESPECT Q1	1	30	21.58
	2	13	29.27
	3	5	29.60
	Total	48	
RESPECT Q2	1	30	23.05
	2	13	24.15
	3	5	34.10
	Total	48	
RESPECT Q3	1	30	22.18
	2	13	27.31
	3	5	31.10
	Total	48	
RESPECT Q4	1	30	23.53
	2	13	25.15
	3	5	28.60
	Total	48	
RESPECT Q5	1	30	20.90
	2	13	28.46
	3	5	35.80
	Total	48	

Test Statistics [a]

	RESPECT Q1	RESPECT Q2	RESPECT Q3	RESPECT Q4	RESPECT Q5
Chi-Square	4.861	3.130	3.309	.717	7.538
df	2	2	2	2	2
Asymp. Sig.	.088	.209	.191	.699	.023

a. Kruskal Wallis Test

Symmetric Measures

	RESPECT Q1	RESPECT Q2	RESPECT Q3	RESPECT Q4	RESPECT Q5
Cramer's V	.235	.222	.270	.311	.322

Table H13: Grouping Variable: Race and Training

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
TRAINING Q1	48	3.83	.781	2	5
TRAINING Q2	48	3.71	.824	2	5
TRAINING Q3	48	3.54	.988	1	5
TRAINING Q4	48	3.44	.848	1	5
TRAINING Q5	48	4.13	.914	1	5
Race	48	1.71	.771	1	3

Ranks

	Race	N	Mean Rank
TRAINING Q1	1	23	27.70
	2	16	22.75
	3	9	19.44
	Total	48	
TRAINING Q2	1	23	25.83
	2	16	24.59
	3	9	20.94
	Total	48	
TRAINING Q3	1	23	28.65
	2	16	22.31
	3	9	17.78
	Total	48	
TRAINING Q4	1	23	27.04
	2	16	22.53
	3	9	21.50
	Total	48	
TRAINING Q5	1	23	26.52
	2	16	21.47
	3	9	24.72
	Total	48	

Test Statistics [a]

	TRAINING Q1	TRAINING Q2	TRAINING Q3	TRAINING Q4	TRAINING Q5
Chi-Square	3.089	.972	4.930	1.721	1.485
df	2	2	2	2	2
Asymp. Sig.	.213	.615	.085	.423	.476

a. Kruskal Wallis Test

Symmetric Measures

	TRAINING Q1	TRAINING Q2	TRAINING Q3	TRAINING Q4	TRAINING Q5
Cramer's V	.367	.338	.385	.326	.244

Table H14: Grouping Variable: Race and Roles & Responsibilities

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
ROLES/RESPONSIBILTY Q1	48	3.00	.968	1	5
ROLES/RESPONSIBILITY Q2	48	3.77	.805	1	5
ROLES/RESPONSIBILITY Q3	48	3.65	.956	2	5
ROLES/RESPONSIBILTY Q4	48	3.35	.863	1	5
ROLES/RESPONSIBILTY Q5	48	3.77	.805	2	5
Race	48	1.71	.771	1	3

Ranks

	Race	N	Mean Rank
ROLES/RESPONSIBILTY Q1	1	23	25.74
	2	16	21.91
	3	9	25.94
	Total	48	
ROLES/RESPONSIBILITY Q2	1	23	27.65
	2	16	20.94
	3	9	22.78
	Total	48	
ROLES/RESPONSIBILTY Q3	1	23	26.91
	2	16	20.66
	3	9	25.17
	Total	48	
ROLES/RESPONSIBILTY Q4	1	23	28.57
	2	16	22.59
	3	9	17.50
	Total	48	
ROLES/RESPONSIBILTY Q5	1	23	27.04
	2	16	22.72
	3	9	21.17
	Total	48	

Test Statistics [a]

	ROLES/RESPONSIBILTY Q1	ROLES/RESPONSIBILITY Q2	ROLES/RESPONSIBILITY Q3	ROLES/RESPONSIBILTY Q4	ROLES/RESPONSIBILTY Q5
Chi-Square	.906	3.042	2.302	5.184	1.797
df	2	2	2	2	2
Asymp. Sig.	.636	.219	.316	.075	.407

a. Kruskal Wallis Test

Symmetric Measures

	ROLES/RESPONSIBILTY Q1	ROLES/RESPONSIBILITY Q2	ROLES/RESPONSIBILITY Q3	ROLES/RESPONSIBILTY Q4	ROLES/RESPONSIBILTY Q5
Cramer's V	.359	.241	.183	.414	.262

Table H15: Grouping Variable: Race and Empowerment

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
EMPOWERMENT Q1	48	4.35	.601	3	5
EMPOWERMENT Q2	48	3.98	.758	2	5
EMPOWERMENT Q3	48	3.92	.710	2	5
EMPOWERMENT Q4	48	3.88	.606	2	5
EMPOWERMENT Q5	48	4.31	.589	3	5
Race	48	1.71	.771	1	3

Ranks

	Race	N	Mean Rank
EMPOWERMENT Q1	1	23	28.11
	2	16	19.88
	3	9	23.50
	Total	48	
EMPOWERMENT Q2	1	23	27.50
	2	16	20.59
	3	9	23.78
	Total	48	
EMPOWERMENT Q3	1	23	27.35
	2	16	24.31
	3	9	17.56
	Total	48	
EMPOWERMENT Q4	1	23	28.48
	2	16	20.13
	3	9	22.11
	Total	48	
EMPOWERMENT Q5	1	23	27.43
	2	16	20.28
	3	9	24.50
	Total	48	

Test Statistics [a]

	EMPOWERMENT Q1	EMPOWERMENT Q2	EMPOWERMENT Q3	EMPOWERMENT Q4	EMPOWERMENT Q5
Chi-Square	4.222	2.887	3.943	5.515	3.202
df	2	2	2	2	2
Asymp. Sig.	.121	.236	.139	.063	.202

a. Kruskal Wallis Test

Symmetric Measures

	EMPOWERMENT Q1	EMPOWERMENT Q2	EMPOWERMENT Q3	EMPOWERMENT Q4	EMPOWERMENT Q5
Cramer's V	.241	.217	.307	.282	.250

Table H16: Grouping Variable: Race and Multi-skilling

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
MULTISKILLING Q1	48	4.19	.673	2	5
MULTISKILLING Q2	48	3.46	.849	1	5
MULTISKILLING Q3	48	3.13	.841	1	5
MULTISKILLING Q4	48	3.25	1.000	1	5
MULTISKILLING Q5	48	2.85	1.010	1	5
Race	48	1.71	.771	1	3

Ranks

	Race	N	Mean Rank
MULTISKILLING Q1	1	23	25.72
	2	16	23.88
	3	9	22.50
	Total	48	
MULTISKILLING Q2	1	23	26.24
	2	16	25.25
	3	9	18.72
	Total	48	
MULTISKILLING Q3	1	23	26.59
	2	16	24.50
	3	9	19.17
	Total	48	
MULTISKILLING Q4	1	23	27.41
	2	16	21.34
	3	9	22.67
	Total	48	
MULTISKILLING Q5	1	23	29.59
	2	16	19.56
	3	9	20.28
	Total	48	

Test Statistics [a]

	MULTISKILLING Q1	MULTISKILLING Q2	MULTISKILLING Q3	MULTISKILLING Q4	MULTISKILLING Q5
Chi-Square	.505	2.236	2.104	2.154	6.358
df	2	2	2	2	2
Asymp. Sig.	.777	.327	.349	.341	.042

a. Kruskal Wallis Test

Symmetric Measures

	MULTISKILLING Q1	MULTISKILLING Q2	MULTISKILLING Q3	MULTISKILLING Q4	MULTISKILLING Q5
Cramer's V	.176	.336	.323	.393	.299

Table H17: Grouping Variable: Race and Communication

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
COMMUNICATION Q1	48	4.27	.536	3	5
COMMUNICATION Q2	48	3.81	.816	1	5
COMMUNICATION Q3	48	3.75	.700	2	5
COMMUNICATION Q4	48	3.35	.978	1	5
COMMUNICATION Q5	48	3.79	.898	1	5
Race	48	1.71	.771	1	3

Ranks

	Race	N	Mean Rank
COMMUNICATION Q1	1	23	26.00
	2	16	22.72
	3	9	23.83
	Total	48	
COMMUNICATION Q2	1	23	26.98
	2	16	21.75
	3	9	23.06
	Total	48	
COMMUNICATION Q3	1	23	27.43
	2	16	20.72
	3	9	23.72
	Total	48	
COMMUNICATION Q4	1	23	26.13
	2	16	23.69
	3	9	21.78
	Total	48	
COMMUNICATION Q5	1	23	27.02
	2	16	23.69
	3	9	19.50
	Total	48	

Test Statistics [a]

	COMMUNICATION Q1	COMMUNICATION Q2	COMMUNICATION Q3	COMMUNICATION Q4	COMMUNICATION Q5
Chi-Square	.776	1.746	3.059	.812	2.455
df	2	2	2	2	2
Asymp. Sig.	.678	.418	.217	.666	.293

a. Kruskal Wallis Test

Symmetric Measures

	COMMUNICATION Q1	COMMUNICATION Q2	COMMUNICATION Q3	COMMUNICATION Q4	COMMUNICATION Q5
Cramer's V	.165	.276	.250	.363	.269

Table H18: Grouping Variable: Race and Respect for Humanity

Kruskal-Wallis Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
RESPECT Q1	48	4.13	.640	2	5
RESPECT Q2	48	3.75	.957	1	5
RESPECT Q3	48	3.85	.652	2	5
RESPECT Q4	48	3.33	.781	1	5
RESPECT Q5	48	3.48	.899	1	5
Race	48	1.71	.771	1	3

Ranks

	Race	N	Mean Rank
RESPECT Q1	1	23	25.91
	2	16	21.75
	3	9	25.78
	Total	48	
RESPECT Q2	1	23	26.11
	2	16	22.06
	3	9	24.72
	Total	48	
RESPECT Q3	1	23	24.24
	2	16	25.75
	3	9	22.94
	Total	48	
RESPECT Q4	1	23	27.39
	2	16	21.56
	3	9	22.33
	Total	48	
RESPECT Q5	1	23	26.52
	2	16	21.03
	3	9	25.50
	Total	48	

Test Statistics [a]

	RESPECT Q1	RESPECT Q2	RESPECT Q3	RESPECT Q4	RESPECT Q5
Chi-Square	1.296	.923	.332	2.271	1.809
df	2	2	2	2	2
Asymp. Sig.	.523	.630	.847	.321	.405

a. Kruskal Wallis Test

Symmetric Measures

	RESPECT Q1	RESPECT Q2	RESPECT Q3	RESPECT Q4	RESPECT Q5
Cramer's V	.233	.236	.183	.239	.201

Table H19: Grouping Variable: Gender and Training

Mann-Whitney Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
TRAINING Q1	48	3.83	.781	2	5
TRAINING Q2	48	3.71	.824	2	5
TRAINING Q3	48	3.54	.988	1	5
TRAINING Q4	48	3.44	.848	1	5
TRAINING Q5	48	4.13	.914	1	5
Gender	48	1.21	.410	1	2

Ranks

	Gender	N	Mean Rank	Ranks
TRAINING Q1	1	38	23.38	888.50
	2	10	28.75	287.50
	Total	48		
TRAINING Q2	1	38	24.39	927.00
	2	10	24.90	249.00
	Total	48		
TRAINING Q3	1	38	24.14	917.50
	2	10	25.85	258.50
	Total	48		
TRAINING Q4	1	38	23.49	892.50
	2	10	28.35	283.50
	Total	48		
TRAINING Q5	1	38	24.20	919.50
	2	10	25.65	256.50
	Total	48		

Test Statistics[b]

	TRAINING Q1	TRAINING Q2	TRAINING Q3	TRAINING Q4	TRAINING Q5
Mann-Whitney	147.500	186.000	176.500	151.500	178.500
Wilcoxon W	888.500	927.000	917.500	892.500	919.500
Z	-1.171	-.113	-.359	-1.051	-.321
Asymp. Sig. (2-	.242	.910	.719	.293	.749
Exact Sig. [2*(1-tailed	.285[a]	.930[a]	.736[a]	.334[a]	.774[a]

b. Grouping Variable: Gender

Symmetric Measures

	TRAINING Q1	TRAINING Q2	TRAINING Q3	TRAINING Q4	TRAINING Q5
Cramer's V	.183	.313	.271	.189	.248

Table H20: Grouping Variable: Gender and Roles & Responsibilities

Mann-Whitney Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
ROLES/RESPONSIBILTY Q1	48	3.00	.968	1	5
ROLES/RESPONSIBILITY Q2	48	3.77	.805	1	5
ROLES/RESPONSIBILITY Q3	48	3.65	.956	2	5
ROLES/RESPONSIBILTY Q4	48	3.35	.863	1	5
ROLES/RESPONSIBILTY Q5	48	3.77	.805	2	5
Gender	48	1.21	.410	1	2

Ranks

	Gender	N	Mean Rank	Sum of Ranks
ROLES/RESPONSIBILTY Q1	1	38	24.01	912.50
	2	10	26.35	263.50
	Total	48		
ROLES/RESPONSIBILITY Q2	1	38	21.74	826.00
	2	10	35.00	350.00
	Total	48		
ROLES/RESPONSIBILITY Q3	1	38	23.84	906.00
	2	10	27.00	270.00
	Total	48		
ROLES/RESPONSIBILTY Q4	1	38	23.08	877.00
	2	10	29.90	299.00
	Total	48		
ROLES/RESPONSIBILTY Q5	1	38	23.64	898.50
	2	10	27.75	277.50
	Total	48		

Test Statistics[b]

	ROLES/RESPONSIBILTY Q1	ROLES/RESPONSIBILITY Q2	ROLES/RESPONSIBILITY Q3	ROLES/RESPONSIBILTY Q4	ROLES/RESPONSIBILTY Q5
Mann-Whitney U	171.500	85.000	165.000	136.000	157.500
Wilcoxon W	912.500	826.000	906.000	877.000	898.500
Z	-.492	-3.040	-.697	-1.474	-.895
Asymp. Sig. (2-tailed)	.623	.002	.486	.141	.371
Exact Sig. [2*(1-tailed Sig.)]	.644[a]	.007[a]	.540[a]	.177[a]	.415[a]

b. Grouping Variable: Gender

Symmetric Measures

	ROLES/RESPONSIBILTY Q1	ROLES/RESPONSIBILITY Q2	ROLES/RESPONSIBILITY Q3	ROLES/RESPONSIBILTY Q4	ROLES/RESPONSIBILTY Q5
Cramer's V	.205	.480	.346	.240	.225

Table H21: Grouping Variable: Gender and Empowerment

Mann-Whitney Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
EMPOWERMENT Q1	48	4.35	.601	3	5
EMPOWERMENT Q2	48	3.98	.758	2	5
EMPOWERMENT Q3	48	3.92	.710	2	5
EMPOWERMENT Q4	48	3.88	.606	2	5
EMPOWERMENT Q5	48	4.31	.589	3	5
Gender	48	1.21	.410	1	2

Ranks

	Gender	N	Mean Rank	Sum of Ranks
EMPOWERMENT Q1	1	38	22.59	858.50
	2	10	31.75	317.50
	Total	48		
EMPOWERMENT Q2	1	38	23.59	896.50
	2	10	27.95	279.50
	Total	48		
EMPOWERMENT Q3	1	38	24.18	919.00
	2	10	25.70	257.00
	Total	48		
EMPOWERMENT Q4	1	38	23.39	889.00
	2	10	28.70	287.00
	Total	48		
EMPOWERMENT Q5	1	38	24.50	931.00
	2	10	24.50	245.00
	Total	48		

Test Statistics[b]

	EMPOWERMENT Q1	EMPOWERMENT Q2	EMPOWERMENT Q3	EMPOWERMENT Q4	EMPOWERMENT Q5
Mann-Whitney U	117.500	155.500	178.000	148.000	190.000
Wilcoxon W	858.500	896.500	919.000	889.000	245.000
Z	-2.075	-.976	-.340	-1.305	.000
Asymp. Sig. (2-tailed)	.038	.329	.734	.192	1.000
Exact Sig. [2*(1-tailed Sig.)]	.065[a]	.387[a]	.774[a]	.297[a]	1.000[a]

b. Grouping Variable: Gender

Symmetric Measures

	EMPOWERMENT Q1	EMPOWERMENT Q2	EMPOWERMENT Q3	EMPOWERMENT Q4	EMPOWERMENT Q5
Cramer's V	.303	.156	.203	.199	.090

Table H22: Grouping Variable: Gender and Multi-skilling

Mann-Whitney Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
MULTISKILLING Q1	48	4.19	.673	2	5
MULTISKILLING Q2	48	3.46	.849	1	5
MULTISKILLING Q3	48	3.13	.841	1	5
MULTISKILLING Q4	48	3.25	1.000	1	5
MULTISKILLING Q5	48	2.85	1.010	1	5
Gender	48	1.21	.410	1	2

Ranks

	Gender	N	Mean Rank	Sum of Ranks
MULTISKILLING Q1	1	38	23.55	895.00
	2	10	28.10	281.00
	Total	48		
MULTISKILLING Q2	1	38	24.42	928.00
	2	10	24.80	248.00
	Total	48		
MULTISKILLING Q3	1	38	23.96	910.50
	2	10	26.55	265.50
	Total	48		
MULTISKILLING Q4	1	38	24.57	933.50
	2	10	24.25	242.50
	Total	48		
MULTISKILLING Q5	1	38	23.34	887.00
	2	10	28.90	289.00
	Total	48		

Test Statistics[b]

	MULTISKILLING Q1	MULTISKILLING Q2	MULTISKILLING Q3	MULTISKILLING Q4	MULTISKILLING Q5
Mann-Whitney U	154.000	187.000	169.500	187.500	146.000
Wilcoxon W	895.000	928.000	910.500	242.500	887.000
Z	-1.041	-.082	-.560	-.066	-1.165
Asymp. Sig. (2-	.298	.935	.576	.947	.244
Exact Sig. [2*(1-tailed Sig.)]	.373[a]	.950[a]	.608[a]	.950[a]	.274[a]

b. Grouping Variable: Gender

Symmetric Measures

	MULTISKILLING Q1	MULTISKILLING Q2	MULTISKILLING Q3	MULTISKILLING Q4	MULTISKILLING Q5
Cramer's V	.184	.086	.225	.310	.441

Table H23: Grouping Variable: Gender and Communication

Mann-Whitney Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
COMMUNICATION Q1	48	4.27	.536	3	5
COMMUNICATION Q2	48	3.81	.816	1	5
COMMUNICATION Q3	48	3.75	.700	2	5
COMMUNICATION Q4	48	3.35	.978	1	5
COMMUNICATION Q5	48	3.79	.898	1	5
Gender	48	1.21	.410	1	2

Ranks

	Gender	N	Mean Rank	Sum of Ranks
COMMUNICATION Q1	1	38	23.18	881.00
	2	10	29.50	295.00
	Total	48		
COMMUNICATION Q2	1	38	23.87	907.00
	2	10	26.90	269.00
	Total	48		
COMMUNICATION Q3	1	38	23.55	895.00
	2	10	28.10	281.00
	Total	48		
COMMUNICATION Q4	1	38	23.30	885.50
	2	10	29.05	290.50
	Total	48		
COMMUNICATION Q5	1	38	23.95	910.00
	2	10	26.60	266.00
	Total	48		

Test Statistics[b]

	COMMUNICATION Q1	COMMUNICATION Q2	COMMUNICATION Q3	COMMUNICATION Q4	COMMUNICATION Q5
Mann-Whitney U	140.000	166.000	154.000	144.500	169.000
Wilcoxon W	881.000	907.000	895.000	885.500	910.000
Z	-1.517	-.672	-1.076	-1.239	-.598
Asymp. Sig. (2-tailed)	.129	.501	.282	.216	.550
Exact Sig. [2*(1-tailed Sig.)]	.212[a]	.556[a]	.373[a]	.252[a]	.608[a]

b. Grouping Variable: Gender

Symmetric Measures

	COMMUNICATION Q1	COMMUNICATION Q2	COMMUNICATION Q3	COMMUNICATION Q4	COMMUNICATION Q5
Cramer's V	.222	.227	.447	.186	.186

Table H24: Grouping Variable: Gender and Respect for Humanity

Mann-Whitney Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
RESPECT Q1	48	4.13	.640	2	5
RESPECT Q2	48	3.75	.957	1	5
RESPECT Q3	48	3.85	.652	2	5
RESPECT Q4	48	3.33	.781	1	5
RESPECT Q5	48	3.48	.899	1	5
Gender	48	1.21	.410	1	2

Ranks

	Gender	N	Mean Rank	Sum of Ranks
RESPECT Q1	1	38	23.16	880.00
	2	10	29.60	296.00
	Total	48		
RESPECT Q2	1	38	23.76	903.00
	2	10	27.30	273.00
	Total	48		
RESPECT Q3	1	38	23.37	888.00
	2	10	28.80	288.00
	Total	48		
RESPECT Q4	1	38	22.43	852.50
	2	10	32.35	323.50
	Total	48		
RESPECT Q5	1	38	23.43	890.50
	2	10	28.55	285.50
	Total	48		

Test Statistics[b]

	RESPECT Q1	RESPECT Q2	RESPECT Q3	RESPECT Q4	RESPECT Q5
Mann-Whitney	139.000	162.000	147.000	111.500	149.500
Wilcoxon W	880.000	903.000	888.000	852.500	890.500
Z	-1.531	-.768	-1.267	-2.178	-1.126
Asymp. Sig. (2-	.126	.442	.205	.029	.260
Exact Sig. [2*(1-tailed	.203[a]	.491[a]	.285[a]	.045[a]	.309[a]

b. Grouping Variable: Gender

Symmetric Measures

	RESPECT Q1	RESPECT Q2	RESPECT Q3	RESPECT Q4	RESPECT Q5
Cramer's V	.228	.168	.278	.319	.205