THE EMERGENCE OF CREATIVITY AND INNOVATION FROM A QUALITY PERSPECTIVE

by

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DECLARATION OF CANDIDATE

I, Francis Martin Doherty-Bigara, declare that unless otherwise indicated, this dissertation is my own work and that it has not been submitted for any degree at another tertiary institution.

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ABSTRACT

Creativity and innovation drive organisational progress and is being heralded as the next competitive frontier for organisations. This study was initiated by current research which showed that the soft (infrastructure) quality management practices which focuses on people and culture had a greater effect on the pursuit of quality and innovation than the hard (core) quality management practices which focuses on techniques and methodology. Adopting a culture of innovation and creativity in quality instead of mere compliance, should drive the corporate quality strategy.

This study made use of qualitative and quantitative research techniques by reviewing national and international related literature and used a questionnaire to investigate 54 ISO 9001 accredited South African organisations, respectively. It also investigated the degree to which creativity and innovation are practiced in these organisations, thereby exploring the gap between the importance of a factor to an organisation and the practice of the same factor.

Results from Chapter 4 show that implementing innovation, the role of management and the role of government in encouraging innovation are very important but insufficiently practiced. The questionnaire revealed that hard/core factors are sufficiently practiced in quality but that the soft/infrastructure factors, which are important to innovation, are not. The respondents indicated that pursuing both quality and innovation simultaneously is an important goal and that the external and internal environment impact on innovation as much as the characteristics of the individual does.

A model which attempts to consider all the factors that impact on innovation and quality is proposed. The model, called the Q_{ic} Model, consolidates previous research on innovation and quality through the Composite Model of Innovation and Quality and then proposes a tool called the Q_{ic} Assessment Matrix which can be used to strategically position an organisation or assess effort in innovation and quality.

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LIST OF ABBREVIATIONS AND ACRONYMS

TQM	Total Quality Management
Q_{ic} Model	Model of Quality Innovation Creativity
SABS	South African Bureau of Standards
QM	Quality Managements
ISO	International Standards Organisation
EQA	European Quality Award
MBNQA	Malcolm Baldrige National Quality Award
SQA	Singapore Quality Award
ABEA	Australian Business Excellence Award
SAEM	South African Excellence Model
SAEF	South African Excellence Foundation
QFD	Quality Function Deployment
FTSE	Financial Times Stock Exchange
R&D	Research and Development
KZN	KwaZulu Natal (a province in South Africa)
SPC	Statistical Process Control

GLOSSARY

Quality

- The continual pursuits of improving all aspects of an organisation so as to gain efficiencies, adapt with the environment, achieve organisation objectives and benefit society.

Creativity

- A cognitive exercise that results in ideas and actions that are new and different

Innovation

- Something is considered an innovation if it is new and different, and useful in fulfilling a particular purpose

Core (hard) quality management

- Technique- and methodology-oriented practices including use of quality data and information, product design process, and use of statistical process control (SPC) and other process improvement techniques

Infrastructure (soft) quality management

- People- and culture-oriented practices focusing on organisation change and development in the areas of management commitment and leadership, relationships with external customers and suppliers, and the management of human resources.

Risk

- The possibility of an outcome not occurring as intended

Methodological pluralism

- A combination of methodological tools, techniques and principles into which the personal skills, values and personality of the researcher delves in order to design and apply the methodology that best suits the situation to attain the desired results

Quality perspective

- A particular approach or school of thought regarding quality that an organisation follows

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Chapter 1

INTRODUCTION

1 INTRODUCTION

Chapter 1 briefly reviews the topics of creativity, innovation and quality focusing on current research and current industry practices. This chapter then describes the aim, objectives and rationale for this study while setting its delimitations. The outline for the rest of the study is then presented.

1.1 Background to the problem

Quality is heralded as a central pillar determining an organisation's success (Murray 2007:31, Kessler 1998:302). Joseph M. Juran (1904-2008), who is considered one of Quality Management's foremost quality gurus, states that "there is a direct correlation between quality and profitability" (Kiani, Shirouyehzad, Bafti, Fouladgar 2009:685). Armand Feigenbaum, who is also considered a quality guru, maintains that, "Quality is now the single most important force in organisational success and growth in national and international markets" (Bendall, Penson, Carr 1995:44). Quality itself is still a very young field as far as management and the sciences go but it is clear that quality should still be pivotal in any organisation's future plans and profitability goals. In fact, it seems that as time passes, the importance of quality in the organisation is becoming increasingly critical.

Creativity and innovation are considered to be the principal aspects that start up organisations and keep organisations competitive in the market place. Elmquist, Fredberg and Ollila (2009:326) state that innovation is a primary requirement for organisations to grow, prosper and maintain high profitability. Johannessen, Olsen and Lumpkin (2001:20) mention that both the general press and academic literature emphasise innovation as being essential to create and maintain competitive advantage. Dobni (2008:539) and Johannessen et al. (2001:33) state that innovation is considered the next level in competitive differentiation, organisation productivity

and profitability and that without the continued search for "newness" in products and processes, an organisation will cease to become competitive, will become irrelevant and will eventually fail. Innovation is a fundamental component of entrepreneurship and also a key element of continued business success.

Creativity, innovation and quality are well-researched topics but their combined relationship is rarely researched and especially not from a quality perspective. Quality has many definitions and applications depending on the context in which the concept appears, as does creativity and innovation.

From a practical perspective, Cottam, Ensor, and Band (2008:88) show that British organisations recognise the competitive importance of innovation but do not know how to implement it operationally. They also state that 80% of senior managers in a sample of US organisations consider innovation to be important while only 4% thought they had the necessary skill to encourage innovation.

It can be seen that the concepts of innovation and quality are essential to the success of an organisation. Thus, there is a need to consolidate the concepts of creativity, innovation and quality, apply it to a quality perspective and produce knowledge that is useful to management in the 21st century.

Creativity and innovation abound in an entrepreneurial organisation. Without these two qualities, industry stagnates. Creativity and innovation are considered to be among the most important qualities that establish the organisation in its infancy yet they are among the first qualities to be shunned as the organisation matures and seeks safe decision-making over risk-taking. Johannessen et al. (2001:27) state that there is a strong correlation between the size of the organisation and the organisation's perception of radicalness as it applies to newness. That is, the larger the organisation, the more radical newness is perceived to be. This brings in the concept of perceived risk. The principle is the same for quality efforts in the organisation. The move from a non-quality to a quality perspective is a positive risk situation requiring creativity and innovation. The organisation has to apply creative and innovative thought and activities in order to implement quality. This means that they are willing to take the risk as the potential

payoff for the organisation is worth the possibility of the exercise failing. However, once the initial risk is taken and the system is established, the research implies that all future new endeavours will be judged quite harshly for their potential risk and disruption of the system.

Nobody disputes the need for creativity and innovation in their quality initiative. In fact, continuous improvement is written into some quality perspectives Total Quality Management (TQM) and like ISO 9001:2008 (in particular Section 8.5.1) and dealt with more completely in ISO 9004:2009. What is less known is the source of creativity and innovation and its emergence from a quality perspective. Once the source is known, it will be useful to understand the inherent risks (financial, operational, and other) associated with the implementation of the innovation.

The study of creativity and innovation in quality is also still a very new field. The theories and concepts researched are still quite fragmented with inconsistent definitions and means of measurement that do not match the definitions. Some synthesis, however, has been attempted by researchers (Johannessen et al. 2001; Elmquist et al. 2009). From reviewing literature, it has become evident that a holistic approach that aims to be useful is needed in order to consolidate the work in creativity, innovation and quality this far, make it useful to management and to initiate further frontiers of learning.

1.2 Statement of the Problem

The problems addressed by this study are:

Problem 1: the source of creativity and innovation from a quality perspective is largely unknown or not made explicit. That is, from where and how does creativity and innovation emerge from a quality perspective? The degree of risk associated with any strategy or tactic to initiate creativity and innovation must be considered simultaneously.

Problem 2: The topics in literature on creativity, innovation and quality need to be clarified and combined into a model (or models) that are useful in consolidating theory and opening areas for deliberate and structured study.

1.3 Aim and Objectives

The aim of this study is to consolidate the findings in literature and compare them, through empirical investigation, to organisations practicing a known quality perspective like ISO 9001.

The aim is fulfilled through the following key objectives:

- To review current literature on the sources of creativity and innovation in general and how creativity and innovation are applied in quality.
- To compare the findings in literature to current business practice through interviews and questionnaires.
- To review the level of risk associated with the implementation of various creativity and innovation initiatives from a quality perspective.
- To consolidate the findings in the form of a model that management may use within their sphere of responsibility as a conceptual tool to manage creativity and innovation and improve quality.

1.4 Rationale to the Study

This study is important in order for the diverse ideas on creativity and innovation from a quality perspective to be investigated and consolidated conceptually. The consolidation of these ideas can then be considered for practical application in business. In consolidating previous work done on the topic, this study will summarise research done by academics internationally thus far and make it locally applicable and available. In doing so, this research also has the potential to be used as a benchmark or standard.

This study also aims to make explicit and accessible in one source the various means, methods, techniques and strategies that are available to stimulate creativity and innovation from a quality perspective and to make them broadly applicable to managers through the formulation of a model. The model that is developed may be able to be expanded and the relationship between the variables quantified in future studies.

The concepts of creativity, innovation, and quality are also looked at from a universal perspective for versatile application. That is, this research is not limited to one particular quality perspective or methodology.

If this study is not conducted then current research will remain fragmented and organisations of all types and sizes will still have no formal way of investigating sources of creativity and innovation in quality and assessing the possible risk involved.

1.5 Methodology

This study explores the topic of innovation from a quality perspective and thus the methodology that is chosen needs to suit exploration and investigation. A multi methodological approach with a strong mix of qualitative and quantitative research is therefore chosen. The approach taken leans heavily on the review of literature to explore what has already been researched and developed on the topic. The approach then also leans on empirical investigation through the questionnaire that is distributed to compare literature to industry practices.

A sample of 5 organisations is chosen for the pilot study. The pilot study is used to review the concepts being tested and to test the research instrument. The final research instrument is prepared once the pilot study is conducted. The sample size for the main study is 54 organisations and, owing to the small size of the total population of 450 organisations, a convenience non-probability sample strategy is taken. The data collection method is via an email questionnaire that consists predominantly of questions that are measured on a 7-point Likert scale.

1.6 Delimitations and Scope

This research is limited to SABS ISO 9001 organisations operating in KwaZulu Natal (KZN). Organisations that have attained the ISO 9001 certification are targeted as they have implemented a clearly defined, generalised, universally applicable, quality management system in the organisation. The International Organisation for Standardisation boasts that over one

million organisations in over 170 countries have implemented the ISO 9001 quality management standard (www.iso.org/iso/home/standards/management-standards/iso_9000.htm). Management and employees of the organisation will thus be aware of creativity and innovation in their implementation of quality through the need to continuously improve as required by the standard. Organisations in KZN are selected for ease of accessibility and cost effectiveness. Organisations were selected irrespective of their size, type or industry. In the instance of this study, the certifying body for the ISO standard is the South African Board of Standards.

The main limitation to research in using ISO 9001 organisations in KZN is the possibility of insufficient diversity of responses. This shortcoming is overcome by the literature review since the first objective of the study is to investigate the emergence of creativity and innovation from a quality perspective from a broad review of literature. This study is also primarily exploratory in nature and so tests the relevance of the topic and constructs to local organisations while consolidating the research already expressed in literature. Therefore, a large number of responses are not required. Also, with the study being exploratory, the aim is not to be exhaustive in consolidating the findings in literature. The study is mostly limited to management and administrative employees in quality although it is not necessarily exclusive to them. This, again, is due to the exploratory nature of the study.

Other limitations:

- The relatively large number of variables to investigate makes the questionnaire lengthy and tedious to complete. This was overcome by limiting the number of open-ended questions while maximising the number of scaled-type questions. Keeping the questionnaire structure as simple and uniform as possible also assists in decreasing the time it takes to complete the questionnaire and maintaining commitment to answering all questions.
- The target respondent was the contact person for ISO 9001. These respondents are employed in a variety of positions at different functional levels – from clerks and machine operators to directors and business owners. The questionnaire needed to be understood by all. In order to accommodate the range of respondents, the questionnaire was reworded into simpler language.
- Only management and administration employees functioning in quality were considered in this study. It was unlikely that operational employees would be allowed to leave their work

and requested to operate a computer simply to answer an online questionnaire. If necessary, the input of operational employees would be better sought through personal interviews. The input from management and administration employees though was considered to be sufficient.

1.7 Assumptions

The following prerequisites are assumed to be in place:

- The targeted organisation had to have an established quality perspective or quality management system in place.
- The respondent had to be directly involved in implementing the quality perspective either administratively or by the nature of their function in the organisation.

The following assumptions were made:

- The quality management system was implemented out of a keen interest for quality as opposed to implementing the system as a means of fulfilling a requirement or a future business arrangement, such as a tender, for example.
- It is assumed that the respondents have sufficient computer knowledge, and that the organisations have sufficient technological resources, to access and complete the questionnaire online or by email.
- The management of organisations having implemented the ISO 9001 quality standard are interested, committed and desire to improve the level of quality within their organisation.
- The improvement in quality through innovative practices leads to improvements to the organisation, the product or service offered and to increased competitiveness.

1.8 Proposing an Acronym for the Q_{ic} Model

This study specifically deals with research in creativity (C), innovation (I) and Quality (Q) and uses the theories, constructs and variables to develop a consolidated schematic model of the findings. The acronym Qic Model (or the preferred Q_{ic} Model with subscript “ic” to indicate that innovation and creativity are limited to a quality perspective) is used.

1.9 Possible Benefits of the Q_{ic} Model

The model is easy to understand and gives management options for strategies and tactics to improve on quality in multiple organisational aspects. The Q_{ic} Model summarises diverse research on the topic and establishes the ground work for future quantitative analysis. The model also assists organisations to fulfil the continuous improvement requirement of quality standards and advises management on how best to manage innovation. The model makes it easier for management to adopt and manage innovation and innovation in quality.

Government can also use the model to establish a framework to build policy, define legislature, and set up support structures that will encourage and support organisational innovation in quality.

Society in general benefits through a higher standard of living as better quality products and services are developed to satisfy needs at a lower cost with a more efficient use of resources.

The Q_{ic} model also highlights various areas for future research.

1.10 Outline of Research

The following is a brief outline of the chapters that appear in this study:

1.10.1 Chapter 1: Introduction

This section describes the parameters of the study, the background/overview, rationale, aim and objectives, and the limitations. Chapter 1 also introduces the rest of the study as well as the proposed Q_{ic} Model.

1.10.2 Chapter 2: Literature Review

This section describes what other academic studies and articles have been written on creativity and innovation in quality management. It clearly defines where the study is going and deals with any definitions or contentions on the subject matter.

1.10.3 Chapter 3: Research Methodology

This section describes the research design, how the research was conducted (the methodology) and other salient aspects about the research instrument, data collection and analysis.

1.10.4 Chapter 4: Presentation of Results

Once the data has been collected, an analysis of the data takes place and results are presented in this chapter. Consolidating the findings from the literature review and from the questionnaire responses into a Q_{ic} Model is also explained in this section.

1.10.5 Chapter 5: Conclusions and Recommendations

In this section, the overall findings of the data analysis are reported. Recommendations are given for further study.

Chapter 2

LITERATURE REVIEW

2 LITERATURE REVIEW

In this chapter the broad concepts of creativity, innovation and quality will be discussed. Relevant theories pertaining to each concept will be highlighted. The concepts will then be clearly defined according to the scope of the study and the interaction between the three concepts discussed. The concept of risk will also be introduced and discussed as it has a direct impact on the assessment and adoption of an innovation and quality programme for an organisation. This chapter delves into the current situation of innovation management and quality management as it is revealed in literature. The chapter then proposes that innovation and quality should not be mutually exclusive but should be combined to form a powerful sustainable organisational tool that will continually grow and develop to serve the needs of society, the organisation and the individual.

2.1 Background to Quality and Innovation

This section provides a background to the concepts of creativity, innovation and quality. It also details why these three concepts are important to organisations and society in general, and thus also gives the reasons why it is important for them to be studied.

Creativity and innovation drive progress. Creativity produces unique and original ideas or combines established ideas in unique and original ways. Innovation occurs when original ideas are implemented. This thought is similarly expressed by Theodore Levitt, editor of the Harvard Business Review from 1985-1989 who stated that “Creativity is thinking up new things, innovation is doing new things” (The Economic Times: www.articles.economictimes.indiatimes.com/2009-08-14/news/28485893_1_levitt-ted-harvard-business-review). It appears as though, creativity and innovation work together and are responsible for starting new

businesses, new products, new concepts, new methods of production and establishing new norms; the connotation of both concepts suggest progression, foresight, and advancement.

Edward de Bono, considered to be the father of lateral thinking, is quoted as saying: “There is no doubt that creativity is the most important human resource of all. Without creativity, there would be no progress, and we would be forever repeating the same patterns" (The De Bono Foundation: www.debonofoundation.co.uk/2009.html). Creativity and innovation are different from mere change. As will be seen, change is simply doing something different. There is no novelty, uniqueness or progress associated with change. When creativity and innovation are applied to a quality perspective, suddenly the implementation of quality becomes different. As will be seen, quality changes from simply fulfilling quality management requirements to comply and moves to a state where it drives progressive and positive change throughout the organisation.

Creativity and innovation are considered to be the next arena of business competitiveness. Those organisations that successfully manage to harness innovation will deliver according to customer expectations, gain greater market share, realise increased revenue growth, speed up delivery to market (from ideas to market), reduce the cost of processes and procedures, and deliver on organisational quality. Macfadzean (2005:350) asserts that “there is a growing need for corporate entrepreneurship and innovation within organisations”.

Elmquist et al. (2009:326) state that innovation is a primary requirement for organisations to grow, prosper and maintain high profitability. Johannessen et al. (2001:20) mention that, both in the general press and academic literature, innovation is necessary to create and maintain a competitive advantage; that it is a fundamental component of entrepreneurship and a key element of business success. Corporate creativity and innovation is being heralded as the next competitive frontier (Macfadzean 2005:350), the next level of competitive advantage (Dobni 2008:539), and the primary driver of success and sustainability (Elmquist et al. 2009:326; Ortt 2008:522). Elmquist et al. (2009:333) cite Berkhout et al (2006), arguing that creativity and innovation should even be included as a fundamental economic factor of production. This view is similarly held by Kiessling and Richey (2004:1273) who argue that the innovative forces within the entrepreneur, who combines the factors of production, and the innovative forces that

disrupt the status quo, both drive progress. There is also a greater need to discover hidden sources of innovation and quality that are not immediately apparent; sources that may not need to be heavily funded such as research and development (R&D); sources that are universally applicable and affordable, and possibly innate within the structures and relationships of the organisation.

Some alternatives to the traditional research and development process that researchers have suggested are total innovation, networked innovation, and open innovation. Leadbeater and Meadway (2008:12) refer to total innovation as a concept that describes sourcing innovation from every aspect of the business and networked innovation as a concept that describes an open attitude towards collaborations and user-led innovation. Elmquist et al. (2009) explore the concept of open innovation which was first introduced by Henry Chesbrough in 2003. Open innovation is a notion that asks organisations to embrace the external environment in its search for innovation. The trend is that innovation is moving away from narrow, localised paradigms to a broad contextual paradigm where each organisation deals with innovation according to their unique context or situation (Ortt 2008:527). The impact of this trend is a less formulaic and decentralised approach to sourcing the creative needs of an organisation.

In his address to parliament on the National Development Plan 2030, Trevor Manuel, the Minister in the Presidency Responsible for the National Planning Commission, stressed the importance of innovation in developing South Africa from a middle income to a high income status country. In his address, Trevor Manuel proposed a framework of collaboration that crossed the borders of higher and further education institutions, State-owned enterprises and private industries (Engineering News: www.engineeringnews.co.za/article/innovation- key-to-progressing-sa-to-high-income-status-manuel-2012-08-15). However, innovation is not alone in its contribution to gaining competitiveness, profitability and satisfying customer needs. Quality management is also a significant component and, similar to innovation, can also affect competition locally, nationally and internationally (Juran 2002:8) or across predefined borders of sectors and industries. Kessler and Chakrabarti (1998:302) argue that quality is a central pillar in determining product and business success due to its effect on reputation and loyalty, and is even responsible for an increased standard of living. But as innovation practices become

more flexible and dependent on an organisation's unique context, it may be required that quality practices follow suit.

Joseph Maciariello is Horton Professor of Management at the Peter F Drucker School of Management and is the Research Director of the Drucker Institute. Peter F Drucker is considered the father of modern management practice. Joseph Maciariello has quoted one of Peter Drucker's objectives as "creating a society of functioning organisations" (Craven 2009:2). According to this thought, management and the fields of innovation and quality proceed through various stages of development similar to individuals and society. As thinkers and practitioners create so too the fields of creativity, innovation and quality develop, evolve and become entrenched. Oschman (2006:197) describes the level of entrenchment of the quality perspective as progressing through the stages "quality of product, quality of institution, to quality of life". Innovation in quality is possibly a powerful direction in the development of a quality perspective on condition that, as Peter Drucker states, "The purpose of a business is a satisfied customer" (Craven, 2009:4).

2.2 Discussion and Definition of Quality and a Quality Perspective

In this section, the concept of quality will be defined and discussed. Defining quality according to its modern context will help managers realise the importance of quality and determine the quality perspective is the organisation or the department.

The concept of quality has been the focus of modern-day organisations since the 1950s (Goldman 2005:217). Although a focus on quality originally started in the USA with Deming and Juran, the American organisations had been slow to adopt a quality perspective (Juran 2002:5). Instead, countries like Japan adopted quality, successfully implemented their unique perspective on quality and reaped the advantages of increased competitiveness, success and revenue, thus gaining in economic strength and attaining a better quality of life (Goldman 2005:217). Quality perspectives like Six Sigma, focusing on core competencies (Elmquist et al. 2009:332) or focusing on critical success factors are examples of internally focused quality perspectives that will produce internal-seeking sources of innovation. As much as TQM may

integrate external organisations into its quality perspective, it also seeks quality and innovation primarily from within the organisation (Karappusami 2006:372). However, TQM policies of a customer organisation may influence the quality requirements of the supply organisation and thus become a source of quality for the supply organisation that would then have to be innovative in the way it fulfils that requirement.

The precise definition of quality has evolved much over the course of time since the days of Crosby, Deming, Feigenbaum, Ishikawa, and Juran. These quality gurus, as identified by Oschman (2006:192), tended to focus on either a conformance to specification or a focus on customer satisfaction perspective, or a bit of both. The evolution of quality proceeded from a product focus to include more holistic concepts such as satisfying the expectations of all business stakeholders and institution-wide organisational quality (Kiani 2007:685). Dalrymple, Edgeman, Finster, Guerrero-Cusumano, Hensler and Parr (1999:140) show that the concept of quality has also reached out of manufacturing and become multidisciplinary, extending into services, administrative processes, and even organisational culture. Broekhuis and Vos (2004:17) indicate that the concept of quality has also begun to embrace more intangible, subjective and intuitive characteristics such as the behaviour of people as opposed to the machine-driven process control statistical measures. Drucker (2007:17), the father of management theory, even states that the concept of quality and its measurement is hard to determine. Ultimately, the definitions of quality vary greatly but the majority of definitions tend to focus on product specification, customer requirements (Kessler 1998:302, Karuppusami and Gandhinathan 2006:372), or are process driven. Hence, nobody seems to be able to provide a universal definition for quality. Poole (2010:7) offers a semantic reason for this, stating that the word quality is a "polysemous noun", that is, the meaning of quality changes with the context of its use. It is clear from the above that the pursuit of quality is being accepted as an on-going journey of constant improvements and not a destination or a completed objective.

It is not just the definition of quality that seems to evade being secured. In a literature review of the various perspectives on quality management and performance, Zu (2008:129) shows that even research in quality has mixed findings. Some empirical studies show that the soft infrastructure quality management practices contribute to an improvement in quality while other studies indicate that hard statistical-driven quality management practices have the

strongest positive contribution to quality improvements. A historical review of the origins of quality (Goldman 2005:219) also show that quality has been viewed differently over time and that it may be a case of deciding which combination of perspectives should be employed rather than which particular individual perspective.

Quality Management (QM) in literature generally falls into two broad perspectives: hard or soft quality management practices. Oschman (2006:195) describes the perspectives as either technical processes and tools (hard QM) or managerial dimensions (soft QM). Zu (2008:131) describes these two broad perspectives as core QM practices (hard QM) or infrastructure QM practices (soft QM) and defines them as follows:

Core (or hard) QM practices means "technique- and methodology-oriented practices including use of quality data and information, product design process, and use of statistical process control (SPC) and other process improvement techniques". An example of such a technique is Six Sigma which is regarded as a top down, disciplined, data-driven approach. Core QM practices can be used at the tactical level to measure product/service quality or at the strategic level to measure ideals like business excellence (Klefsjo 2001:32). Core QM practices, however, leave out the human element entirely.

Infrastructure (soft) QM practices means "people- and culture-oriented practices focusing on organisation change and development in the areas of management commitment and leadership, relationships with external customers and suppliers, and the management of human resources." Leadbeater (2008:12) uses the terms technological innovation or business innovation to describe the focal point of innovation along the lines of the two main quality perspectives – core quality management (for technological innovation) and infrastructure quality management (for business innovation) respectively. The preference of a researcher's focus seems to fall into either the core or infrastructure perspective but seldom both. Studies reviewing the broader body of knowledge on quality show that both core and infrastructure quality management practices are important.

According to Zu (2008:131), the seven most studied QM practices are top management support, customer relationship, supplier relationship, workforce management, quality

information, product/service design, and process management. Karuppusami and Gandhinathan (2006:379) lists a mixture of hard and soft QM practices in literature that reveal the primary critical success factors of a quality perspective like TQM. The top seven out of 56 critical success factors that appear in TQM literature are statistical control and feedback, quality planning from a policy and strategy focus, strategic planning, continuous improvement, learning, knowledge, and work attitudes.

These findings are also consistent with Sila (2002) who isolated 25 key hard and soft QM factors in TQM research between 1989 and 2000. The studies mentioned resolve the conflict of which QM practice is more important in producing quality with the explicit answer being that both are needed. It must, however, be noted that the majority of items in the lists are in the soft QM practices.

For the purpose of this study the precise definition of quality is not so important. As discussed previously, in each context the definition of quality will change to suit the context of the quality perspective being employed. What is important is that each and every manager and person involved in implementing a quality perspective knows precisely what quality means to the organisation, has a good understanding of the internal and external context of the organisation, and knows how to put the quality perspective into effect within their sphere of responsibility. As an example, Lorente (1999:14) states that although many organisations adopt a quality perspective like TQM, it does not mean that the quality perspective adopted is the best for innovation. In other words, it is important for the managers and leaders of the organisation to choose the right quality perspective and to communicate the quality perspective to all relevant stakeholders in order to aid the outworking of that quality perspective.

Therefore, a quality perspective that an organisation adopts or designs for itself simply means the unique viewpoint that the organisation has on the concept of quality according to their circumstance, environment and objectives (Oschman 2006:194). An organisation's quality perspective would include how the organisation chooses to implement its own quality initiatives. This may be achieved with a strong focus on core QM practices, infrastructure QM practices, or a blend of both. This contextual perspective is confirmed by recent research which

indicates that both core and infrastructure perspectives work in tandem to increase the effect on quality performance (Zu 2008:142; Oschman 2006:199).

Zu (2008:137), in particular, developed a very useful model showing the effects of core and infrastructure QM approaches. The conclusion to the research is that infrastructure QM indirectly affects quality performance but directly affects core QM practices; core QM practices directly affect quality performance, and that both core and infrastructure quality management practices should be integrated into a quality perspective (see Figure 2.1 below).

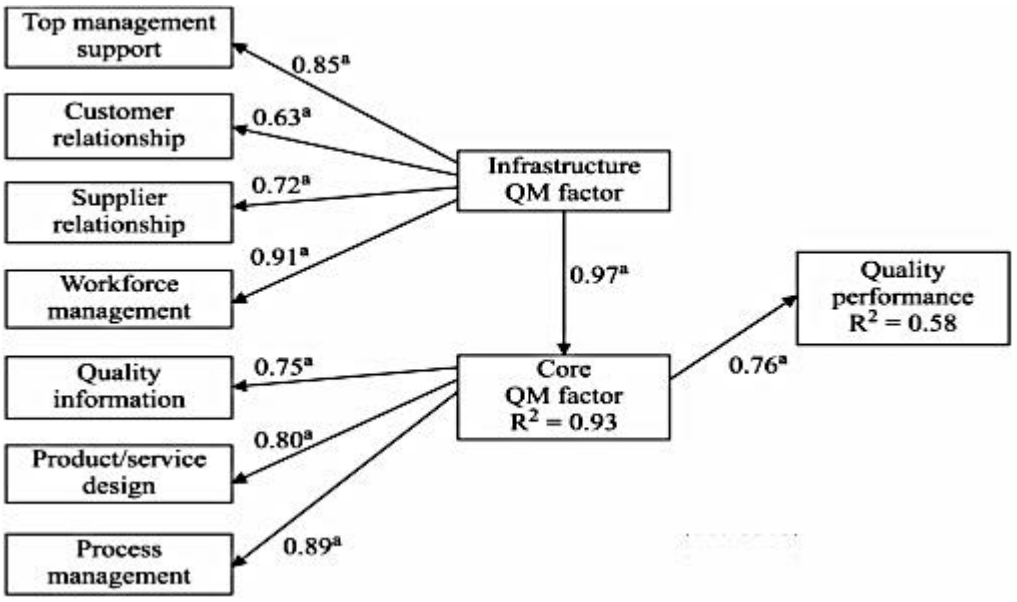


Figure 2.1: Zu (2008:141) shows the correlation between infrastructure and core quality management factors that ultimately affect quality performance.

Figure 2.1 also illustrates the concept that a number of components, independently and collectively, contribute towards a quality perspective, and that a list of individual factors that affect quality can be compiled. Zu (2008) can also be summarized as in Figure 2.2 below, showing that an organisation has the opportunity to create a unique mix of infrastructure QM and core QM to create its unique quality perspective and influence its quality performance.

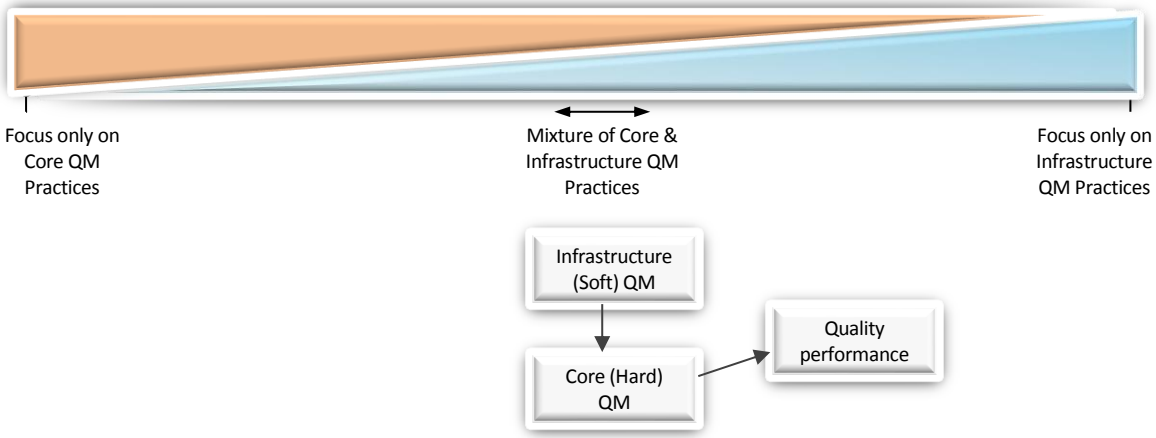


Figure 2.2: An adaptation of Zu (2008:137) to illustrate the quality "mix" along a continuum between infrastructure and core quality management practices.

In a field that is more statistically driven than human nature driven, Motlhape (2002:21) states succinctly that "People are an essential element of a quality management system." Harrington (1999:5) cites Joesph M Juran as stating that 80-85% of problems in quality are caused by management (people) simply by virtue of the fact that management decide on the system, are responsible for it and have the authority to change it. Considering the huge impact of the human element on quality that is presented, it thus becomes clear that both the hard and soft aspects of quality management need to be incorporated into the unique quality perspective of the organisation.

This study attempts to study the emergence of creativity and innovation from a quality perspective from a holistic organisation point of view rather than just the quality department. Firstly, not every organisation has a designated quality department. Secondly, there is a move away from closed, insular quality practices initiated and implemented from within the organisation to open, collaborative quality practices that interact with the organisation's business environment. Thirdly, there is also a move from quality being a concept that embraces the entire organisation rather than one being limited to just the manufacturing process. These movements are being spurred on by quality standards such as ISO 9001 and ISO 9004.

In summarising the above discussion, the following definition of quality is proposed: Quality is the continual pursuit of improving all aspects of an organisation so as to gain efficiencies, adapt to the environment, achieve organisation objectives and benefit society (source: adapted by the Researcher).

The next section analyses the concepts of creativity and innovation and then discusses the various areas from which creativity and innovation can emerge.

2.3 A Discussion and Definition of Creativity and Innovation

In this section, the concepts of creativity and innovation will be discussed. This section will also look at the broad sources from which creativity and innovation can emerge. A keen knowledge of the environment and context within which creativity and innovation thrive will enable the decision makers within an organisation to adjust the organisation's internal environment and orientate it to a culture of creativity and innovation.

2.3.1 Creativity and Innovation

The concepts of creativity and innovation are more important to define than the concept of quality as the definition will determine precisely what creativity and innovation is, how it emerges, how it can be measured, when it has been achieved and how it can be incorporated in a quality perspective. As has been indicated in the introduction and discussion this far, it is the synergistic inclusion of creativity and innovation to the quality perspective that will augment the benefits of quality and bring the quality perspective to life.

Johannessen et al (2001:20) have noted in their study that prior research has not managed to produce a broadly accepted definition of innovation or any good measures for it. Macfadzean (2005:352) and Dobni (2008:539), among others, have also noted that previous definitions of innovation have just caused greater ambiguity and a broad diversity of incongruent views. Some researchers say that innovation is a process and then highlight the different phases while others introduce peripheral concepts like marketing philosophies, focus on the success of the

adoption of the innovation, or try and isolate simple causes and effects of innovation. A lack of consensus makes it very difficult to compare findings.

It is generally accepted in literature that creativity is associated with innovation and that change, meaning something different, is the result (Dobni 2008:543). However, change and difference do not mean that the result is innovative. Johannessen et al (2001), Mohamed (2002:620) and Macfadzean (2005:353) point out that a key thought in defining innovation is the concept of newness and difference. Morris (2011:62) takes the concept one step further and defines creativity as a cognitive exercise that results in ideas and actions that are new and different. Johannessen et al (2001:21) delimit the concept of newness even further by asking what is new, how new, and new to whom? The answer to the question "What is new?" produces a list of items, "How new?" implies a continuum showing the degrees of change from incremental to radical, and "New to whom?" points to a list of possible recipients or stakeholders. Johannessen et al, (2001:23) use the term "the relevant unit of adoption". If the innovation is not new and useful to the relevant units of adoption then it is just simply change, doing something different; while doing something new and different brings about competitive advantage and creates new markets and industries (Macfadzean 2005:353).

Johannessen et al (2001) also suggest that the extent of creativity and innovation can be subjectively assessed and measured by answering the following four questions:

- Is it new to the relevant unit of adoption?
- Does the relevant unit of adoption consider it to be different?
- Does it have economic value/utility?
- Does it fulfil a performance outcome/objective?

If the answer to these four questions is YES, then innovation has occurred. It is thus possible to determine if innovation has occurred or not, to measure the extent/impact of the innovation and to measure the impact of the influencing variable.

The relationship between creativity and innovation can be described more acutely as well. According to Morris (2011:62), creative ideas and actions can only be considered an innovation if they have economic value. The concept of economic value would have to be restricted to a profit-seeking organisation in a free market environment. In a model of innovation, Dobni

(2008:541) describes the result of an innovation culture as a "performance outcome". Seeking economic value is the desired performance outcome of profit-seeking organisations and therefore innovation is useful in fulfilling this objective. It is thus reasonable to infer that for all other situations the concept of innovation having utility or usefulness, having practical worth or value, might be more appropriate. Therefore, something is innovative if it is new and different and useful in fulfilling a particular purpose such as obtaining increased economic value, social upliftment or even happier employees (Morris 2011:61).

Macfadzean (2005) sums up the concept of innovation thus "innovation can be defined as a process that provides added value [or economic value or utility] and a degree of novelty [or newness] to the organisation and its suppliers and customers [the relevant unit of adoption] through the development of new procedures, solutions, products and services as well as new methods of commercialisation" (Covin and Slevin, 1991; Knox, 2002; Lumpkin and Dess, 1996).

Combining the research of Morris and Macfadzean thus far, the following Figure 2.3 can be presented:

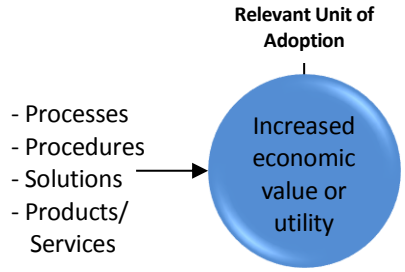


Figure 2.3: An illustration of part of the innovation process delivering on its intended purpose.

Morris (2011:62) maintains that creativity is an essential element of innovation. Without creativity there is no innovation, creativity is the basis of innovation and leads to innovation. Morris's argument can be illustrated as in Figure 2.4 below:

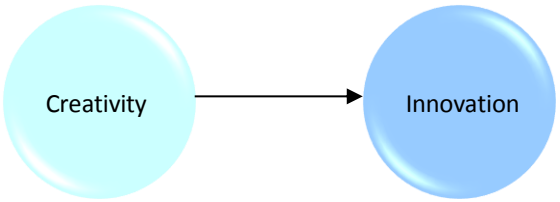


Figure 2.4: An illustration showing the process of creativity to innovation.

Figure 2.4 illustrates the relationship of creativity and innovation as discussed above. Thus Macfadzean (2005) and Morris (2011) can be further illustrated in the following diagram:

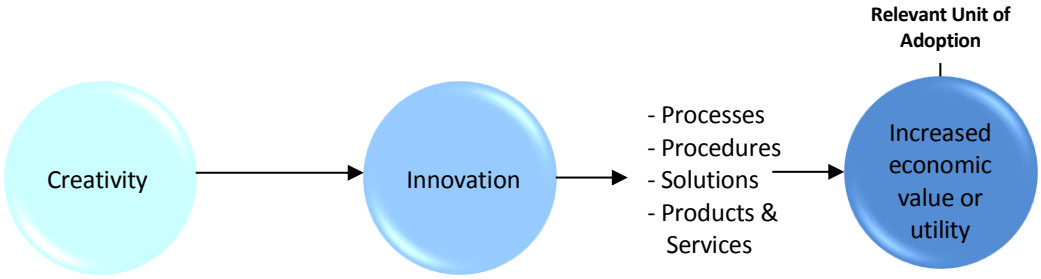


Figure 2.5: An illustration showing the process of creativity and innovation delivering on an intended purpose.

Therefore, in order to benefit from the economic value that comes with an innovation, it is necessary to employ creative personnel, create an environment for creativity or initiate those activities that foster creativity. For The balance of this study the concept of innovation will include creativity.

A broad review of literature confirms that innovation occurs in the areas to do with products and services (meeting consumers'/customers' needs), production process (meeting business productivity, cost, quality requirements) and management systems and business innovation (responding to market conditions and internal management issues) (Lorente 1999:12). These areas focus on quality; and so there is a strong association between innovation and quality. This implies that both innovation and quality can be combined and pursued simultaneously and that each might benefit from the pursuit of the other.

2.3.2 An Innovation Continuum

Johannessen et al (2001:23) have noted that the degree of innovation can vary along a continuum from incremental to radical. Macfadzean (2005:353) calls this a novelty continuum with the least risky innovation being slight changes in product style and the most risky changes being major innovations. Drucker (1985:15) uses the term "creative imitation" for incremental innovation (the safest, least disruptive form of innovation) and defines it as a previously developed innovation that is applied in a new setting. Similarly, Macfadzean (2005:356) cites Paulson Gjerde et al (2002) who use the terms "entrepreneur as creative imitator" and "entrepreneur as originator" to describe the two extremes of the continuum. However one describes the two extremes, it is quite clear that a continuum does exist. To keep the descriptions simple, the terms "incremental innovation" and "radical innovation" are used in this study (see Figure 2.6 below). The degree of innovation is a subjective assessment at this point and depends on a variety of factors such as type of industry, history of innovation, and customer expectations. For example, the actions that may be considered incremental innovation in one industry may be considered to be radical in another industry. A similar perception may even exist between different individuals. Figure 2.6 below illustrates this continuum.

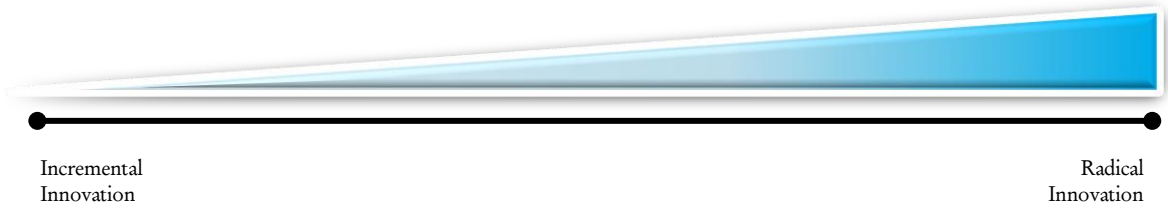


Figure 2.6: A continuum illustrating the various degrees of innovation from incremental to radical.

The major differences between incremental and radical innovation is the degree of change over time, the complexity and severity of the change, the amount of risk (or possibility of failure) that is associated with the change, as well as the cost and pervasiveness of the change. Examples of this continuum then are small changes or innovations to products, services or business processes on the side of incremental innovation and large changes or innovations such as the complete reengineering of products, services or business processes on the side of radical innovation (Lorente 1999:15).

Where an organisation is situated (or should be situated) on the innovation continuum is based on a number of factors. A major factor is the nature of the external market environment which may or may not support incremental innovation but may need more radical innovation and risk taking or vice versa (Lorente 1999:12).

2.3.3 Innovation Culture and the Business Environment

Dobni (2008:540) confirms that much of the literature on organisational innovation places organisation culture as the most significant influencer to innovation. There certainly seems to be no lack of writing on organisation culture and innovation with most research confirming the same points; that is, describing the ideal culture to stimulate creativity and innovation. The next factor most often focused on is the need for top management support of innovative ideas and activities. Since top management is essentially the main influencer/designer of the organisation's culture, they can safely be grouped with organisation culture as the primary influencer of innovation and culture.

Organisational innovation does not operate in isolation but is influenced by a greater context, just as organisation performance is influenced by the organisation's environment (Redshaw 2001:16; Mohamed 2002:620). For example, in times of economic recession, the budget for research and development is normally reduced and may impact on an organisation's innovation capacity at a time when the organisation may need to be more innovative. Government policy shapes the macro environment as well and can influence its variables for decades or possibly a generation and more (Leadbeater and Meadway 2008:6, Redshaw 2001:6). Economic recession and the effects of government policy will thus affect individual's and organisation's actions, responses and performance. Therefore, as much as managers can directly control and impact the culture of their organisation and the level of innovation and quality that occurs in it, there is a subtle but powerful indirect influence on the organisation by the external environment. Hence, innovation is affected by forces from within the organisation as well as from the external environment.

A discussion on innovation at four different levels ranging from the individual person to national government will be considered below.

2.3.3.1 Innovation at the Macro Environment Level

Research on innovation largely focuses on innovative individuals or an organisation culture for innovation. The individual or the organisation is often seen to operate in isolation with regard to their innovative characteristics. Systems Theory shows that the individual and the organisation is a subsystem of a larger system. The organisation is, therefore, a subsystem of its business or market environment. The market environment is also a subsystem of the macro environment which in itself is a subsystem of the international environment (Mohamed 2002:620). Thus, government legislation, plans and actions can have a marked positive effect on both innovation and quality if government leaders place an emphasis on efforts that will stimulate innovation and quality (Redshaw 2001:16).

Goldman (2005:217) aptly notes that Japanese national culture has made a significant contribution to the level of quality it maintained. The success of Japan as a modern day economic superpower is directly attributed to the involvement of the Japanese government which implemented quality programmes for organisations. Japan's "Keiretsu" programme linked government and major industrial organisations to attain growth of 8-10% per annum. Juran (2002:5) states that the cumulative effect of a large number of organisations successfully attaining quality standards is that it has brought Japan to a state of world leadership in quality. The Deming Prize in Japan, The European Quality Award (EQA) in Europe, the Malcolm Baldrige National Quality Award (MBNQA) in the USA, the Canada Excellence Awards, the Singapore Quality Award (SQA) and the Australian Business Excellence Award (ABEA) (Karuppusami 2006:373; Juran 2002:8; Klefsjo 2001:33, Williams 2008:2) are examples of government/industry programmes that positively influence organisations through rewards and accolades. According to Juran (2002:8), the winners of the Baldrige Award greatly out-perform the Dow Jones industrial averages. The effectiveness of these programmes will depend on buy-in from the organisation's leaders, government support and the market strength of the programme.

South Africa had its own prestigious award programme called the South African Excellence Awards (SAEA) which was promoted through the South African Excellence Model (SAEM) and administrated by the South African Excellence Foundation (SAEF). The SAEF was

launched in 1997. In 2001, the SAEF's Articles of Association were changed and, as a result, by 2003, the organisation ceased to operate (Williams 2008:39). No significant prestigious award has since been established for quality.

2.3.3.2 Innovation at a Regional Level

Leadbeater and Meadway (2009:14) describe regional coalitions that implement innovation strategies which considerably increase the innovative capacity of the region as a whole. These regions can be local, national or international but the cumulative effect of the alliance is the increased innovative capacity of each organisation subsystem of the region and therefore the increased innovative capacity of the whole system. Johannessen et al. (2001:21) also mention an increase in attention given to studies of how innovation is influenced by national and regional innovation systems. There are numerous examples of the effect that government policy, legislation and programmes can have on the business environment. Government policies can hinder or encourage growth therefore government (even at a provincial level) should create the appropriate policies that focus on creating a beneficial environment for innovation and quality to thrive. The limit is the imagination, ethics and intentions of the policy makers.

To solidify the outward perspective and influence from the environment, Drucker (2007:15) suggests that the best time to make changes is when the external environment is favourable, when other organisations and people are doing it or when one can make a substantial list of successful results that an organisation has attained from implementing changes. That is, the external environment has an effect on individual organisations and can be designed to positively influence them towards quality and creativity.

2.3.3.3 Innovation at Management Level

Peter Drucker (Drucker 2007:14) describes a time when IBM executives were not considering the innovations occurring in their external environment. As a result of management's lack of observations, IBM was left behind due to the innovative developments in communication to the extent that the only way they could regain competitive edge was to buy their way back into communications. He also states that executives need to be receptive to the environment and make the necessary changes within the organisation according to the resources available.

Similarly, Redshaw (2001:16) and Kingsland (2007:2) note that competitive activity influences the overall performance of an organisation and thus can influence its innovation activities. Harrington (1999:5) reports on a study completed at AT&T Network Systems which revealed that 82% of problems were caused by the process that was designed and implemented by management while 18% were caused by people, machinery and tools within the system. It can thus be seen that management is a critical level at which the responsibility of creating, implementing and monitoring innovation begins. Management is in direct contact with both the external and internal environments of the organisation and is responsible for the design of systems and processes.

2.3.3.4 Innovation at the Level of the Individual and Between Levels

Society is also changing. More people are becoming knowledge workers by gaining expert knowledge in specialised fields and it is becoming increasingly difficult for one person, one department or one organisation to contain all the skills and ideas needed to maintain a competitive edge (Elmquist et al. 2009:327, Redman 2001:16). Therefore, there is a need to look outside the organisation. According to futurist thinker Frey (2010) (www.wfs.org/content/city-future-–-part-one), future trends that are expected to evolve are a deeper entrenchment of the idea of telecommuting, collaboration on projects between companies instead of permanent employment of skills and expertise, increased online business presence and transactions and an increased surge in contract employees and entrepreneurship in response to job uncertainty and corporate bureaucracy. Thus, the nature of the environment that an organisation exists in has, and will continue to have, a significant impact on the organisation's tendency for creativity, innovation and quality as well as that of the individual.

As an example of the organisation affecting the individual and the individual affecting society, a study done by Motlhape (2002:28) indicates that organisations can cause undue stress on employees, causing physical sickness and social problems. As an example of innovation and quality at the individual level, Goldman (2005:220) states that in order to implement TQM, a particular quality perspective, there needs to be a "complete reorientation of job descriptions and duties" that affects the individual. Similarly, Professor Thomke of Harvard Business School states that a commitment to innovation and quality must be written into the individual's job description and then enforced (Eliseeva 2009:12). Quality and innovative individuals will in

turn affect organisation quality and innovation. There is, without a doubt, a constant interaction and influence between the different levels and within each level.

Considering the discussion put forth, the different levels of innovation culture from highest collective authority to the lowest can then be summarised in the illustration below:

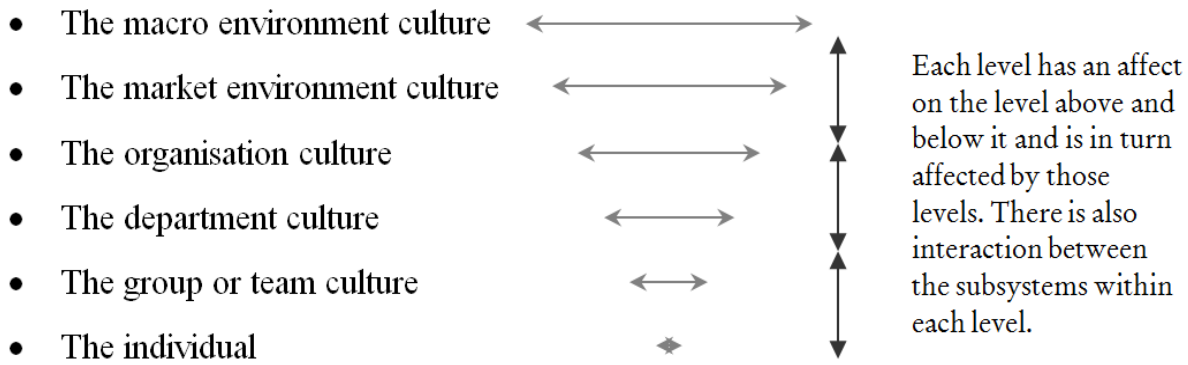


Figure 2.7: A diagram illustrating the relationship between the different levels that innovation can occur at.

Figure 2.7, above, shows that there is interaction between the different levels as each level has an effect on the one above or below it and it is in turn affected by the other levels. The relationship between the levels is the same as that expressed by systems theory where each system is a subsystem of a larger system and is influenced by the other subsystems and the larger system itself. The broad contextual illustration presented above principally summarises a variety of cultural innovation focal points that need to be considered for the emergence of innovation and quality.

Figure 2.7 is not intended to imply that innovation at the lower levels cannot occur without the authority and support of the upper level. Higher levels can be subtly circumnavigated via the different line functions as each person implements quality and innovation principles within their sphere of authority and responsibility causing an up swell of innovation and quality. Top management may only be required for an easy, decisive organisational wide implementation of a quality programme. For example, the authority to add quality or creativity and innovation requirements into employees' job descriptions may only occur at the senior Human Resource manager's level. The decision to manage according to quality and innovation principles occurs

with each individual manager. Each manager is responsible for how he manages his department. In this way, the organisation will slowly and incrementally change for the better from the bottom to the top.

Herzberg's (1959) two-factor motivation-hygiene theory states that some demotivating aspects just need to be absent for innovation to occur but that innovation would occur even more significantly if it were directly encouraged. For example, applying the motivation-hygiene theory to government or organisational policy, a less regulated environment (a hygiene factor) does not stimulate innovation but it does allow innovation to occur naturally if an appropriate incentive programme (motivation factor) is used to directly stimulate innovation. In general management theory, military-style management is less effective at encouraging innovation and creativity than a team management style.

Though the concepts of creativity and innovation from a quality perspective have been constructed, there is still a strong need, both in literature and for this study, to develop appropriate scales and valid measures of organisational innovativeness (Dobni 2008:540). Such a scale was developed by Dobni (2008:546) and Wang and Ahmed (2004) with regard to measuring innovation culture. A similar scale would need to be developed to measure the impact on innovation of all the various factors that affect innovation. The four components of an innovation culture described by Dobni (2008) therefore seem to be the most pragmatic and useful in its measurability. Dobni (2008:540) defines an innovation culture as "a multi-dimensional context which includes the intention to be innovative, the infrastructure to support innovation, operational level behaviours necessary to influence a market and value orientation and the environment to implement innovation". The four items of an innovation culture, according to Dobni (2008:541), are thus the intention for innovation, the infrastructure to support innovation, the orientation of employees for innovation and the context to support innovation risks.

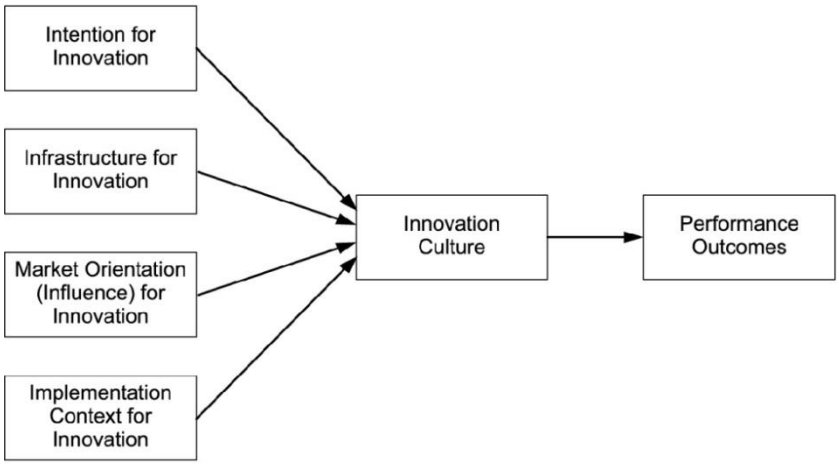


Figure 2.8: A model of innovation illustrating the 4 components of an innovation culture (Source: Dobni 2008:541).

The scale Dobni uses is structured around seven factors that encourage innovation, namely, innovation propensity, organisational constituency, organisational learning, creativity and empowerment, market orientation, value orientation and implementation context. More details about the scale and methodology can be found in Chapter 3.

It is still unclear, however, how creativity and innovation emerge. The suggestion of the discussion thus far is that creativity and innovation may emerge from any of the innovation culture areas mentioned. In the light of this for example, Elmquist et al. (2009:326) posit the need for organisations to open their internal innovation processes to the external environments in order to gain innovation benefits through open innovation – a type of outsourcing of innovation or allowing the external influence on innovation. This statement implies that there is a closed internal innovation process such as the traditional Research and Development (R&D) Department that looks to itself for good ideas. The statement then implies that this insular department can then choose to interact with and be influenced by the various elements and characteristics of its external environment which will mould and change the nature of the department and the organisation. In this example, two very broad sources of creativity and innovation have been mentioned – the internal environment and the external environment.

The source of innovation from the external environment may come from copying processes from peer organisations or drawing inspiration from other industries (Elmquist et al. 2009:327) such as mimicking the development process of Open Source Software (OSS); working in

collaboration with inventors, manufacturers or developers such as Unilever (www.unilever.com/innovation/collaborating/workingwithus/index.aspx) and Procter and Gamble's "Proudly Developed Elsewhere" claim (Elmquist et al. 2009:337); relying on customer input; collaborating with peer organisations in similar or unrelated industries in order to combine skill and resources for mutual benefit; and pooled or leveraged R&D resources between collaborating organisations (Elmquist et al. 2009:329). Typically, drawing influence from the external environment is a lot less controllable. However, since innovation thrives in an unregulated environment, less control may be a benefit. Interestingly, Elmquist et al. (2009:327) report that the motivation for organisations to indulge in open innovation is similar to that of the entrepreneur, that is, to seek profit through disruptive new innovations. This then swings the theory for the external environment back to the internal environment as an entrepreneurship culture can be a factor of the Human Resource policy, leadership style or organisation culture. Procter and Gamble's "connect and develop" policy, as described by Elmquist et al. (2009:332), is an example that includes the innovative characteristics of the entrepreneur-type individual.

Elmquist et al. (2009:340) maintain that the locus of innovation is not necessarily a single point but may be distributed among many role players. These role players may be within the organisation, outside the organisation or even on the boundary of the organisation and involve multiple people, groups, processes and systems simultaneously. Figure 2.9, below, illustrates this view:

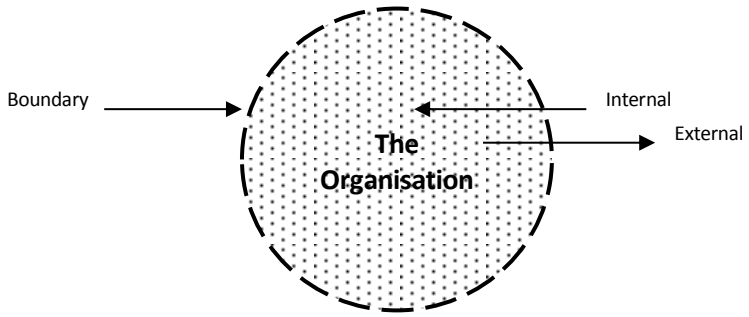


Figure 2.9: An illustration indicating that organisational innovation can be dispersed.

According to Redshaw (2001:17), whatever innovation quality perspective the managers of the organisation design and implement, four questions need to be answered and measured to determine its effectiveness: is the perspective achieving goals, increasing resourcefulness,

satisfying clients, and/or improving internal processes? If these four questions can be answered positively and proven, then the perspective is working for the organisation.

2.4 The Link between Creativity, Innovation and Quality

In this section, the relationship and similarities between creativity, innovation and quality are described. By applying creativity and innovation to a quality perspective, the perspective will be able to evolve and develop over time ensuring continual improvement and success.

The concepts of creativity, innovation and quality are not mutually exclusive, but intertwined. For example, the need for innovation is a requirement of incremental quality improvements in TQM (Karuppusami and Gandhinathan 2006:378). But Lorente, Dewhurst and Dale (1999:12) argue that although TQM in itself does not hinder innovation, only some aspects of TQM actually assist innovation. Therefore, TQM, a quality management system used world-wide, in itself does not provide the tools for innovation. Total Quality Management is therefore weak in the area of assisting creativity and innovation in quality. However, other techniques like Quality Function Deployment (QFD) combat the need for innovation in quality through the requirement of cross functional teams to carry out projects; thereby creating a source of creativity and innovation and a check system on quality design (Shen, Tan and Xie 2000:91). From a broad perspective though, Cottam et al. (2001:89) show in their benchmark study of the FTSE 100 that the United Kingdom industry is not taking any steps to build a strategic commitment to innovation. As much as organisations state that they are pursuing creativity and innovation in quality, it is still a façade. Organisations still need a comprehensive study and tool to combine creativity, innovation and quality.

According to Lorente (1999:13), quality perspectives generally state that innovation is a requirement but that the quality perspective itself does not reveal the source of innovation or provide the tools for innovation to occur. Therefore, quality and innovation can be seen as two essential components of a whole, not as separate mutually exclusive concepts. Many of the principles that encourage innovation also encourage quality. Strategies that are implemented for innovation can also be implemented for a quality perspective. So in many

regards innovation and quality are similar and therefore can be implemented simultaneously and in a similar fashion. Zu (2008:141) found that both infrastructure and core quality management practices are required but that it is within the infrastructure quality management practices that creativity and innovation will reside. According to the above argument, a quality innovation perspective might be a more accurate term to describe the two separate perspectives as one embodied perspective.

Macfadzean (2005) sums up the concept of innovation stating that "innovation can be defined as a process that provides added value [or economic value or utility] and a degree of novelty [or newness] to the organisation and its suppliers and customers [the relevant unit of adoption] through the development of new procedures, solutions, products and services as well as new methods of commercialisation" (Covin and Slevin, 1991; Knox, 2002; Lumpkin and Dess, 1996). Quality had also been defined earlier as "the continual pursuit of improving [the new innovation] all aspects of an organisation [the units of adoption] so as to gain efficiencies, adapt with the environment, achieve organisation objectives [the economic value or utility] and benefit society [the ultimate objective]. Many similarities can be seen between the two definitions of innovation and quality.

An illustration of the quality innovation relationship is shown below in Figure 2.10. In the illustration, quality can be seen as the core perspective while an innovation perspective is simultaneously embraced and encouraged such that innovation will continually be applied to all aspects of the organisation where quality is enforced and to the quality perspective in itself, almost causing perpetual change, alterations and adaptations to the system as new aspects are created. As such, the organisation grows and evolves to maturity.

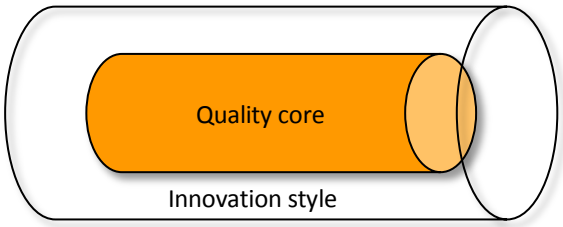


Figure 2.10: A diagram illustrating the concept that quality and innovation are stronger together.

A key difference in the concepts of innovation and quality in literature is that quality has more solid empirical research in its favour, especially when it comes to core or hard quality management processes that are statistically driven. Innovation literature tends to focus on the softer management or people skills, the infrastructure quality management practices. Fig. 2.11 illustrates the need for research in innovation to move into the core QM arena with statistical measurement while research in quality with its well established measurement norms needs to move toward the softer infrastructure QM arena.

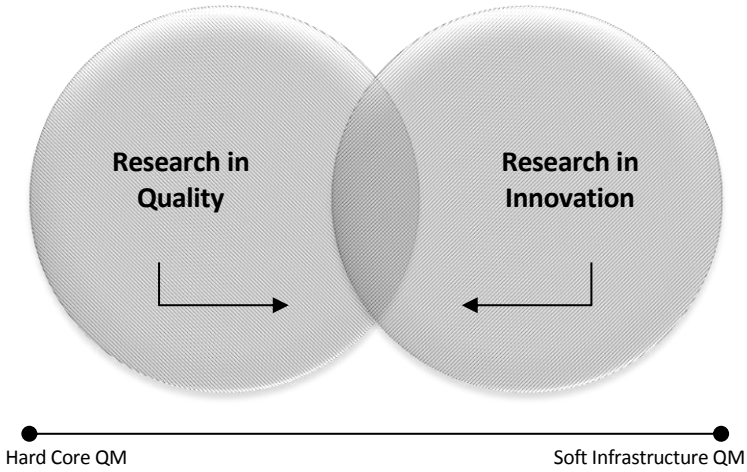


Figure 2.11: A diagram illustrating the opposite poles of current research in quality and innovation and the need for them to merge.

A literature review of the concepts showed many areas from which creativity and innovation can emerge. Applying what can be learnt from this research to a quality perspective and a quality perspective that is constantly changing, evolving, growing and delivering economic value or utility to the organisation as society develops. No matter how one looks at it, or which viewpoint one decides to pursue a quality perspective, there will have to be a substantial commitment of resources, effort, training and education of employees, and discipline to follow through on the decision (Klefsjo 2001:32).

The focus of this study is on the emergence of creativity and innovation from a quality perspective. The term emergence implies a more deeply ingrained sustainable growth from within the organisation and not just a mere short term ad hoc innovation technique, strategy or adjustment; although some of these will be addressed too. In the next section, a list of key areas from which creativity and innovation can emerge from a quality perspective, is proposed. Each of these key emergence areas will form a component of a proposed model on quality, innovation and creativity called a Q_{ic} Model. As a result of the above, a multi-methodological approach to creativity, innovation and quality will be taken under the premise that any one single approach does not have all the answers but is useful in providing the theoretical building blocks needed to deal with each unique requirement and circumstance in which the organisation and its people find themselves (Watkins 2004:46). More about a multi methodological approach will be discussed in Chapter 3.

2.5 The Effect of Risk on Innovation

In this section, the concept of risk is addressed. The degree of risk to an organisation that is involved in implementing a specific innovation will determine whether the innovation will be carried out or not.

Risk is inherent in innovation (Morris 2010:3). Innovation requires doing something new and different which immediately implies risk. The underlying assumption of risk is that with great risk there is the possibility of great reward (Morris 2010:3), and the possibility of great failure as well (Cole 2008:137). Johannessen et al. (2001:27) assert that innovation can be expressed on a continuum and defined by its degree of radicalness. Kirton (2003) labels the innovation continuum from "adaptors" on the one end (or "creative imitation" as Drucker (1985) calls it) to "innovators" on the other end. McFadzean et al. (2005:361) also propose a risk continuum with small internal efficiencies on the one side and entirely new products for new markets on the other. Johannessen et al. (2001:27) maintain that the degree of radicalness is a subjective construct and that it differs according to the size of the organisation. The degree of radicalness that is perceived by the organisation will also determine its perceived risk and return ratio and therefore the decision whether to implement a particular course of innovation or not (McFadzean et al. 2005; Gehrke and Britz 2002). Therefore, the degree of risk for a particular

strategy involving innovation needs to be assessed. Risk can therefore be placed on a continuum as illustrated in Figure 2.12 below:

Figure 2.12: A basic risk continuum

Other tools for measuring innovation and risk are available. Goldman (2005:222) suggests competitive benchmarking, for example. In Figure 2.13 below, Morris (2010:9) shows a basic 2x2 weighted risk-reward matrix to assess various innovation projects. The ideal is for an innovation strategy that is being assessed to end up in the top left quadrant where the innovative idea is assessed as being low risk and high reward. The weighting is subjective according to those who are assessing the projects. The projects that are chosen will depend on the organisation's unique risk profile (Morris 2010:9). Cole (2008:141) describes a similar method of assessment that assesses the potential risk and reward and the organisation's view of risk, that is risk inclined or risk disinclined. Thus, it can be simply concluded that different types of innovation carry with them different types of risk. In this vein, Morris (2010:10) highlights a spectrum of innovation-risk types: incremental innovation, breakthrough innovation, business model innovation and new venture innovation. Morris, however, does not state the level of risk associated with each type merely that the level of risk varies.

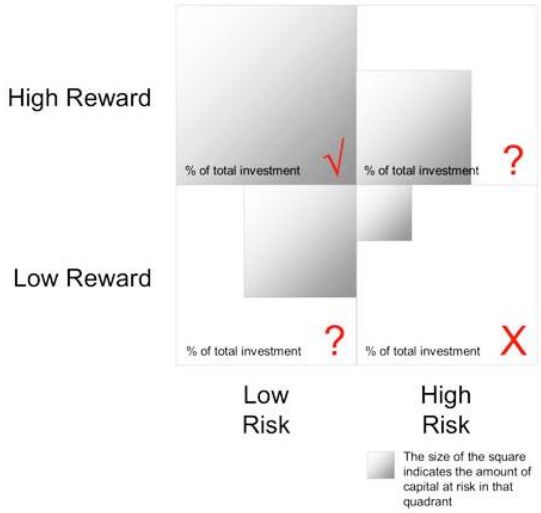


Figure 2.13: An example of a Weighted Risk-Reward Matrix developed by Morris (2010:9).

Risk is a very familiar topic to companies and it can be seen from the matrix above that risk applies to innovation in a quality perspective as much as it does to any business interest. So while there is a need to innovate in order to remain competitive, there is also a need to assess risk. These two concepts of innovation and risk will always be in contention as "the new always harbours the danger of unknown risks" (Pfiffner 2001:78).

2.6 The Emergence of Creativity and Innovation

This section will look at studies that have investigated the sources of innovation and the factors that affect quality. This section will also look at studies that have compiled lists of factor items for innovation and quality as well as models that have consolidated and integrated other studies. The aim of this section is to determine the sources of creativity and innovation and investigate the relationship of innovation to quality. The use of lists and models that integrate multiple concepts and theories will also be reviewed.

A number of researchers have established a list of areas from which creativity and innovation can emerge. Dobni (2008:542) cites Damanpour (1991) as having constructed a list of 13 determinants of organisational innovation with statistical significance for 9 of them. Dobni (2008:543) also cites Wang and Ahmed (2004) as having developed a list of 20 innovation determinants for measurement. So the idea of a list of innovation items is not new but a comprehensive and exhaustive list of items needs to be compiled.

Kessler and Chakrabarti (1998:303) isolate the following as factors that affect quality output: organisational policies; organisation culture as communicated through the organisation's mission, and the values and behaviour that are encouraged; the characteristics of individual employees; the structure and nature of the work group that individuals find themselves in; and the quality of the development process.

Karuppusami (2006:379) identified 56 critical success factors of TQM. These factors that determine or affect quality are also potential sources for the emergence of creativity and innovation from a quality perspective. These factors will be different for each organisation and

continue to change over time as the context of the business environment changes and new knowledge is discovered.

Many authors have produced useful models that summarise their studies on specific areas of creativity and innovation (see Figure 2.14 and Figure 2.15 below). The theories and models, however, are still stand alone studies. From the list of factors mentioned previously, it is clear that there are multiple internal and external factors that influence creativity and innovation and that innovation can be exercised specifically to quality in the organisation. By consolidating current research, a more thorough list of factor items that influence the emergence of innovation can be created. This list of factor items can then be applied to areas of quality in the organisation. For example, an organisation culture that promotes freedom of thought and risk taking encourages innovation. Therefore, if freedom of thought and risk taking are applied to a specific area of quality, such as quality product materials, the employees involved in manufacturing and design will have greater freedom to experiment and discover than they would be in the alternative management culture of stifling bureaucracy. Organisation culture is an internal organisation factor that can be directly controlled by management. Similarly, Drucker (2007:15) states that during a recession, organisations are forced to be innovative to stay competitive. The economic climate of a country is an external organisation factor that cannot be controlled by management even though it still affects the level and type of innovation.

The model developed by Kessler and Chakrabarti (1998:304) is the closest model reviewed that seeks to combine various aspects of quality and show their effects on innovation as described above. Kessler and Chakrabarti (1998) conducted an empirical investigation to determine the relationships between various methods. The model is illustrated in Figure 2.14, below, and it illustrates that some studies into the empirical relationship of the factor items on innovation and quality have been conducted but that this also needs to be comprehensive in scope.

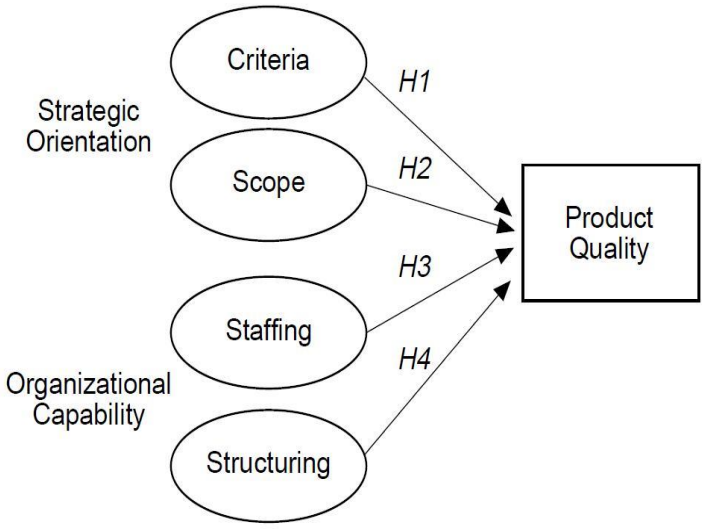


Figure 2.14: Conceptual model of methods influencing the quality of new product innovations (Source: Kessler and Chakrabarti, 1998:304).

Macfadzean et al. (2005:365) conducted a study that integrated the various concepts and relationships that are relevant to the corporate entrepreneur and innovation. Figure 2.15, below, shows the integrated model. The model shows the effective consolidation of various theories into one model as is one of the aims of this study.

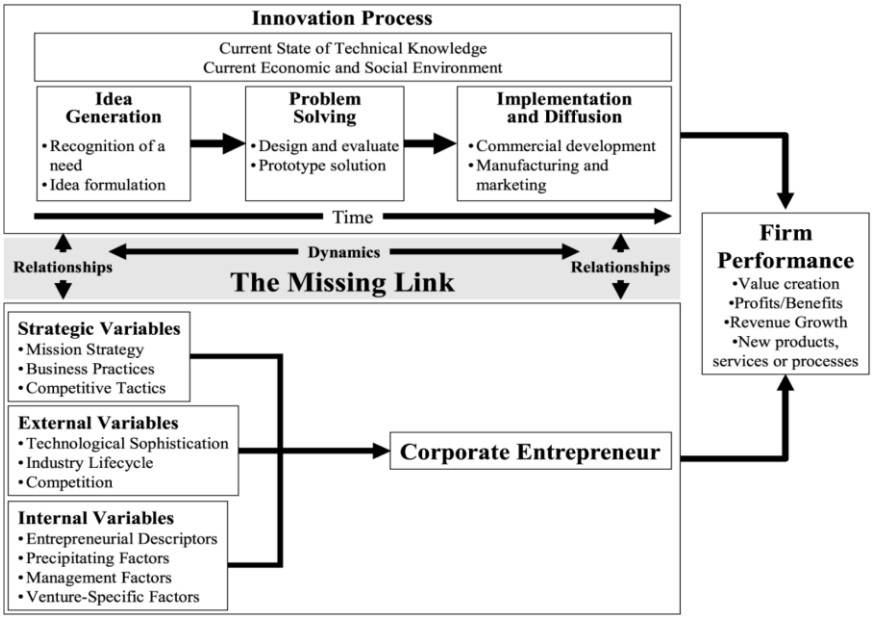


Figure 2.15: The "missing link" between entrepreneurship and innovation (Source: MacFadzean et al., 2005:365).

Some studies provide a useful generational taxonomy of innovation models (MacFadzean 2005; Ortt and van der Duin 2008; Elmquist et al. 2008) that need to be incorporated into any holistic research on the subject. Innovation management has gone through a number of phases in its short life of formal research and business application. The modern contextual approach to innovation and quality, as used in this study, is an adaptation of the approaches that have gone before it. Rothwell (1992), as cited in Macfadzean (2005:360), provides a useful generational classification of innovation process models. This classification shows the origins of innovation management, current thought and practices and how innovation is likely to occur in the future:

- First generation - technology push model
  Innovation is pushed by the continual need for new technology. The focus is on research and development;
- Second generation - need pull model
  The expressed needs of consumers pull innovation into satisfying their needs;
- Third generation - coupling model
  Innovation is both pushed by technology and pulled by the needs of consumers;
- Fourth generation - integrated model
  Innovation is sought cross-functional, inter-organisational, and along the supply chain;
- Fifth generation - systems integrating and network model
  Innovation is sought through all the above methods but with a strong focus on collaboration with stakeholders, high use of technology, organisation strategic focus and a focus on quality (Rothwell, 1992).

This generational classification by Rothwell (1992) is useful in that it expresses some very broad sources of innovation from a quality perspective. These areas are research and development; customers or consumers; between functions, between organisations, or along the supply chain; or through full external collaboration with stakeholders. But MacFadzean et al. (2005) note that none of the models in their investigation that date back as far as 1971, comprehensively investigate the sources and characteristics of innovation.

Ortt and van der Duin (2008:523) propose that the source of innovation may be contextual and may be found in the innovator's or organisation's context and therefore a contingency approach to innovation may be needed as opposed to a generic model (Drejer 2002).

Some organisations, like Unilever, are already experimenting with the next step in innovation by inviting new ideas and opportunities for collaboration through open innovation. Unilever employs 6000 designated research and development (R&D) professionals worldwide (Innovation at Unilever: www.unilever.co.za/innovation/innovationinunilever/) yet they still invite other organisations and people to openly collaborate with them on projects of innovation not initiated by Unilever's R&D centres (Collaborating with Unilever: www.unilever.com/innovation/collaborating/workingwithus/index.aspx). The definition of open innovation varies between researchers and their topic of study but open innovation is essentially a process allowing parties in the external environment to interact and work with the organisation. The organisation is therefore open to innovation where the source is not internal. The idea is to not rely only on the R&D department for innovation but to become more dependent on various stakeholders and society at large for ideas (Elmquist et al. 2009:340). Matheus (2009:255) posits the use of technology to increase the depth and quality of innovation through inter-organisation collaborations. Therefore, organisations are taking uncertain and risky steps forward to explore new ground in innovation. Each organisation chooses its own route according to the knowledge and competencies it has.

The concepts of creativity and innovation in a business context, although not knew, are not sufficiently well researched. The challenge with creativity and innovation is that they are difficult to measure. Although the concept of quality and the concepts of creativity and innovation are not new, they are only now being applied to the field of quality and only to some aspects of quality, such as product development, for example. Also, the research that has been done only covers a narrow set of aspects. A holistic approach to the sources and application of creativity and innovation from a quality perspective is needed in order for management and organisations to fully embrace its advantages.

Initially, it was thought that the number of broad areas from which creativity and innovation could emerge from would be endless. A review of literature revealed that this was not the case.

This view is reflected by the quality guru Joseph Juran (2002:5) who qouted every owner as saying “Our business is different” yet discovered that their quality problems were the same. Literature also showed that different components would have different degrees of effectiveness and this would also depend on the pervasiveness and relevance of the application of the innovation.

Creativity and innovation from a quality perspective is not the focal point of one area in the organisation but of multiple areas. From the above discussion, it is apparent that the conditions, intention and focus of innovation need to be reviewed as there are many different aspects that affect innovation from a quality perspective. For example, Johannessen et al. (2001:28) state that numerous studies have been made on the various external and internal organisational factors that influence innovativeness. Such factors are also cited by other authors describing specific environments that stimulate or suppress creativity and innovation. Lorente et al. (1999:13) and Hannabuss (2007) state that a component of business innovation is innovation in management thinking. Martins and Terblanche (2003), Ahmed (1998:30), Dobni (2008) make note that creativity and innovation are factors of the culture of the organisation and the individual. According to Ahmed (1998) and Elmquist et al. (2009:341), the organisation structure and the leadership within the organisation have a significant effect on the source and use of creativity and innovation. McFadzean et al. (2005:356) cite work by Jin (2000) that both the internal and external environment of the organisation also has an impact while Linkletter and Maciariello (2009:336) take a more metaphysical stance and consider the impact of spirituality (and alongside it morality, integrity and ethics) on the organisation, quality and the source of quality innovations which is so undeniably prevalent in the work of some great management thinkers like Peter Drucker. A number of authors also emphasise the importance of entrepreneurship (including corporate entrepreneurship or intrapreneurship) and the associated behaviour styles and attitudes as necessary for innovation (McFadzean et al. 2005:252). Peter Drucker states that the intention of innovation should be considered; that innovation should be done for the consumer first and not the shareholder (Nelson 2009:3 and Craven 2010:4). A major gap and shortfall in literature is that all of these individual studies need to be combined into one workable whole.

The above discussions on creativity, innovation, quality, risk and the emergence of creativity and innovation indicate that a list of factors that will promote the emergence of creativity and innovation from a quality perspective can be developed and used as a measurement scale. These factors can also be assessed for their risk-reward potential and thereby assist managers in initiating and managing innovation in quality according to an organisation's quality perspective. Other studies have illustrated that a composite model of innovation that integrates multiple theories, concepts and relationships can also be developed. In the spirit of innovation, quality and continuous improvement, Thomas Edison is quoted as saying "There is a way to do it better – find it" [7].

2.7 Conclusion to Chapter 2

Creativity, innovation and quality are important concepts for today's management to acquire so that they can usher in the business models and processes of tomorrow. The concepts of innovation and quality are not revolutionary in their newness or novelty since they have been around for a long time now. However, applying innovation to all areas of business is not currently a general practice though some companies have embraced them successfully and have reaped the rewards for doing so. In addition, governments are able to change their policies towards favouring innovation and so change the context and environment that the organisations operate in and stimulate (or impede) innovation. The types of individuals that are employed in an organisation will also affect the organisation's capability and propensity for innovation.

Chapter 3 follows and will assimilate the nature of the concepts discussed in this chapter and propose a model that may be useful in encouraging and assessing innovation from a quality perspective.

Chapter 3

RESEARCH METHODOLOGY

3 RESEARCH METHODOLOGY

This chapter describes the research design and methodology, how the research was conducted and other important aspects such as the research instrument, the pilot study, the population sample and data collection and analysis. The methodology is designed to bring together the literature review (the research of academics locally and internationally) and the thoughts and experiences of practitioners of quality in South Africa. The structure of the research is illustrated and some pertinent concepts such as methodological pluralism will also be discussed.

3.1 Introduction and Background to the Research Methodology

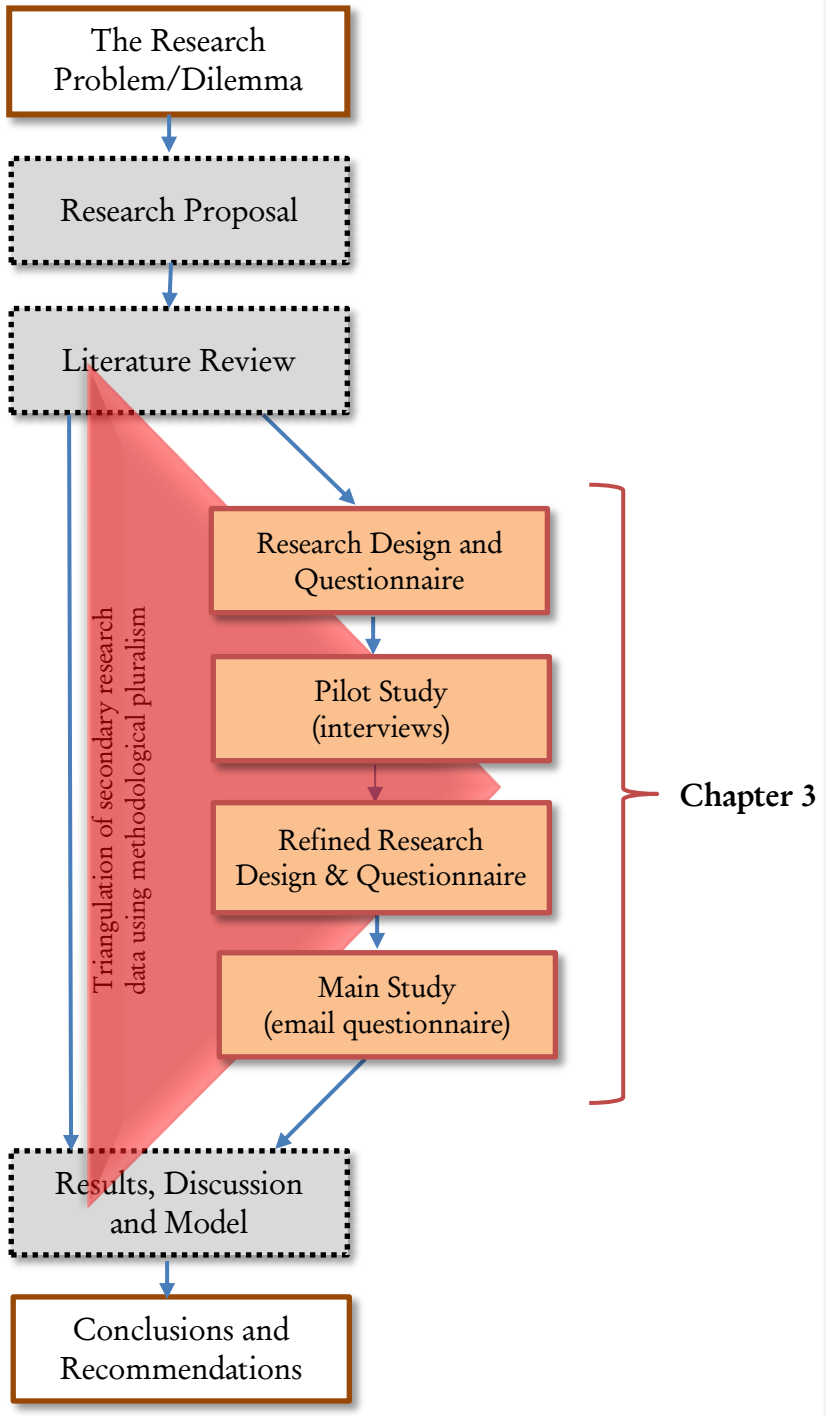
The research design is the plan or blueprint of the proposed research process (Mouton 2008:55). The research design focuses on the type of research being planned, for example if the research is qualitative or quantitative, and the end result. The research design thus focuses on the research question and how to answer the research question logically. The research design is different to the research methodology. According to Mouton (2008:55), the research methodology is the "systematic, methodical and accurate execution of the design". The research methodology therefore fulfils the purpose of the design. The research methodology is in essence only concerned with the tools and procedures that will fulfil the research design. The research design and methodology work together and an explanation of the methodology will often need the design to be described in order to justify the actions. As a result, this section leans on both the methodology and the design in order to get a better understanding of the thoughts and intentions behind this research.

The research approach taken in this study is largely exploratory or descriptive in order to determine and verify the variables that contribute to encouraging the emergence of creativity and innovation from a quality perspective both in literature and in practice. Therefore, no specific hypothesis is offered; a similar approach is taken by Kessler (1998: 304). Cooper and Schindler (2001:139) also state that, although both quantitative and qualitative techniques are used, qualitative techniques are relied on more heavily in exploratory research. A similar approach is taken in this study where there is a strong qualitative component expressed in the literature review, pilot study interviews, and a somewhat opinion-seeking questionnaire. This study also has a strong quantitative component which is seen in the statistical analysis of the opinions sought by the questionnaire. Therefore, the research begins with a study of existing literature (as seen in Chapter 2) and ends with the statistical analysis of the results from the questionnaire (see Chapter 4). The review of literature is therefore qualitative and the statistical analysis is quantitative.

The literature review is the starting point of the study as it is here that all current work by academics on the topic can be reviewed (Mouton 2008:87). It is at this point that the researcher can discover what has been done before, how it has been done, what was the result and if there are any gaps. A review of literature reveals that a lot of research has been conducted on the topic of creativity, innovation and quality but this research is fragmented and inconsistent. A review of literature also reveals that researchers have shown much success in isolating a list of variables or factor items from literature that can be further explored and then tested via a questionnaire using a Likert scale (Dobni 2008, Kessler 1998, Karruppusami 2006, Su 2008). As a result, the research methodology in this study follows similarly.

Once the variables are sourced and tested for relevance, they will be included in a composite model describing the emergence of creativity and innovation from a quality perspective. This model will assist managers in plotting a way forward with an innovation programme in quality and will be dealt with in Chapter 4.

The Research Process



SUMMARY OF ACTIVITIES

How does creativity and innovation emerge from a quality perspective?

Innovation and quality is considered the next competitive frontier. Research in innovation and quality is fragmented. Management need a tool to use.

A summary of research and thoeries by other researchers, list of factor items, methodologies used by others.

Non-probability sample

Interview conducted with personnel in 5 organisations.

Questionnaire using a Likert scale to gauge the Importance and Practice of 41 factor items.

Questionnaire distributed via email to 450 ISO 9001 organisations in KZN

Statistically analyses and discusses the findings in literature compared to industry and proposes the Q_{ic} Model as a theoretical basis for further investigation.

Consolidates the theories from literature to build the Qic Model and propose further areas of research.

Figure 3.1: Flow chart illustrating the process of work through this study.

According to Cooper and Schindler (2001:61), the research process should be rooted in a management dilemma and should then follow a sequential series of steps for planning and project management purposes. The research methodology in this study thus includes the steps: the research problem/dilemma, the research proposal (both found in Chapter 1), the literature review (found in Chapter 2), the research design and questionnaire, the pilot study, the refined research design and questionnaire, and the main study (all in Chapter 3), the presentation of results (Chapter 4), and the conclusions and recommendations (Chapter 5). This is also illustrated in Figure 3.1. As can be seen by the work flow diagram, the research is founded on an industry problem which is then developed into a proposal for research. The literature review then fulfils the dual purposes of exploring the topic that ultimately leads to the research design as well as directly contributing to the overall results and the development of a model. The steps involved in the design of this research are discussed in this chapter. A similar process is followed by other researchers in commerce fields.

Some key concepts and techniques used in the research process need to be justified and expounded before the research design and methodology are described further.

3.2 Key Concepts and Considerations

The following topics played a key role in the research design and thus deserve some explanation and discussion.

3.2.1 Methodological Pluralism

The emergence of creativity and innovation from a quality perspective is tempting to investigate from the perspective of a single school of thought, such as the Systems Perspective or Total Quality Management, or from a particular focus point, such as focusing on statistical techniques or organisation culture (Coffman 1995, Martins and Terblanche 2003). However, if each school of thought or focus area can contribute something to the field that is being studied then it is possible for all contributions from all fields to be included in one holistic approach. However, no single approach thus far seems to express the multitude of variables that are involved in a holistic approach (Watkins 2004: 46). A multi methodology or methodological

pluralism approach is therefore needed to create a generally applicable model and cater for the greatest breadth of organisations and their unique situations.

Watkins (2004: 46) refers to methodological pluralism as an alternative means of approaching quality issues within organisations that do not necessarily have the time, money, resources, skills, or specialised training to deal with quality. Methodological pluralism can also apply for discovering the sources of creativity and innovation and its implementation; no individual method might give the answers but a multi-methodological approach may provide the most suitable options. As a result, this study takes a multi-methodological approach to answer the research question from literature and then explores how important some of the concepts are to the respondents and what is implemented practically in organisations in South Africa. From this, a model will be developed incorporating the many approaches so that managers can diagnose their organisation or department and apply a best-fit technique that takes into consideration the full extent of the organisation's dynamics. In practice, multi-methodology can triangulate problems and solutions by using various approaches that will either support or discredit deductions.

The argument for taking a multi-methodological approach is, firstly, for flexibility and versatility; so that an organisation can select an appropriate strategy to implement or improve on its current quality perspective without it having to be an organisation-wide business reengineering process. In this way any organisation, small or large, can make important, incremental or revolutionary improvements to its quality paradigm, as management deems necessary, through a process of creativity and innovation. Improvements can then also be restricted to specific areas of the organisation, for example to specific departments, or to methodologies and organisational processes. The second reason, as Mitroff and Linstone (1993) postulate, is to reduce the risk that focusing on only one perspective will cut off all the other options by which the problem may be explored (Watkins 2004: 45).

Peter Drucker, considered the father of management, followed a methodological pluralism approach (Craven 2009: 2), focusing on management from the perspective of people, power, values, responsibilities, structure and constitution, leadership and governance as well as a broader societal construct (Craven 2009: 1). Fredmund Malik, Professor at St Gallen Graduate

School of Business Management, interpreted Drucker as being "well aware that management in the 21st century would have to meet new challenges and in particular the challenge of the complexity of dynamic interconnected systems, be they biological or electronic, consisting of networks of men, organisations or all together in the creation of systems of systems". The findings by Zu (2008: 142) on quality management show that the design and implementation of a quality management programme should include a number of different integrated approaches and that organisations often place greater emphasis on the softer, interpersonal infrastructure quality management practices than they do on the harder, statistical driven core quality management practices. Therefore, a single approach is unlikely to be sufficient to address creativity and innovation from a quality perspective for all organisations.

Denzin (2005:35) distinguishes four forms of a multi methodological approach:

- Data triangulation – more than one sampling strategy is used to gather data.
- Investigator triangulation – more than one researcher is used to collect and interpret data.
- Theoretical triangulation – more than one theoretical perspective is used to research and interpret the data.
- Methodological triangulation – more than one method is used to collect the data.

Methodological pluralism allows for triangulation. Triangulation is the use of more than one approach to verify the final outcome. Using this method in researching and in implementing a quality perspective makes the process and system more robust.

According to Watkins (2008:47), Mingers (1997:7) states that the following comprises a multi-methodology design in practice:

- One or more methodologies
- One or more paradigms
- Same or different intervention
- Whole or part methodology
- Imperialist or mixed

Multi-methodology, therefore, is a combination of methodological tools, techniques and principles into which the personal skills, values and personality of the researcher delves in

order to design and apply the methodology that best suits the situation to attain the desired results (Watkins 2008:48, Ormerod 1997:56). Cooper and Schindler (2001:76) encourage researchers to use diverse methodologies and also make note of the possible financial and time burden.

Methodological pluralism and triangulation is used in this study in two ways. One way is through the use of qualitative and quantitative research methods to determine the relevance of a list of items to the emergence of creativity and innovation from a quality perspective. Qualitative research is conducted by reviewing relevant literature and incorporating it into the overall theoretical knowledge of the study. The literature used for the application of innovation in quality is from various schools of thought (for example, TQM, Drucker, and six sigma), from different industries (for example, general business, information technology, and manufacturing), from diverse countries (for example, South Africa, the Netherlands, and United States of America) and from various disciplines (for example, library sciences, general management, leadership studies, education and cultural studies). Quantitative research is conducted through the email distribution of questionnaires to which the responses from respondents are measured on a 7 point Lickert scale.

The second way methodological pluralism and triangulation are used is by encouraging a multi-theoretical and multi-methodological view of creativity, innovation and quality in an organisation in order for the managers to create a best fit situation to creativity and innovation according to the organisation's unique quality perspective and context. This concept is derived from Chapter 2 where it is suggested that both a core quality management practice and an infrastructure quality management practice is necessary to improve quality and to encourage innovation (Zu 2008).

Watson (2004:50) quotes Hamel and Prahalad (1989:70) who describe the need for a multi-methodology approach by stating that, "It is not very comforting to think that the essence of Western strategic thought can be reduced to eight rules of excellence, seven S's, five competitive forces, four product lifecycles, three generic strategies, and innumerable two-by-two metrics."

A weakness with a multi-methodology approach, however, may be the unsettling nature of the perceived lack of concreteness and final authority of a specific approach. For example, the perception is that if it is stated in the TQM Handbook, then it must be right or if ISO 9001 does not have it as a standard, then it cannot be important. This perceived lack of concreteness is further exacerbated by the perception that the multi-methodological approach may promote researcher bias. Cooper and Schindler (2001:76) note, however, that several competing designs should be considered before the final research design is decided. This process actually makes for a more robust design and promotes insight into the research problem. In reality, every approach uses something of a multi-methodology approach until the approach is validated, formalised, adopted and solidified into one general accepted approach. A true multi-methodological approach, though, would remain flexible and be continually updated with current knowledge. In taking a multi-methodological approach, some research papers that may be considered slightly older are included in so far as their theories and research are still valid today.

3.2.2 List of Scale Items

Generating a list of items that are considered important to the research in question is not a new idea. Dobni (2008: 545-546) generated a list of items to measure innovation culture. This list and the methodology used were based on Churchill's (1979) general methodology design and detailed item analysis. In this study, 117 items were identified and measured using a 7-point Likert scale. The use of a scale to measure items dates back to the behavioural psychologists, Ghiselli (1964) and Likert (1967), who developed the tool to measure behaviour.

Many examples of the scaled item methodology being used exist. Feng (2006:272) uses six constructs or items based on the Malcolm Baldridge National Quality Award to measure TQM in an organisation. Kessler (1998:305) used 28 items and a 13-point scale to investigate methods that affect the quality of new product innovations. Karruppusami (2006:379) identified a 42 item list of critical success factors of TQM and cites similar studies that used scales as measures. Redshaw (2001:17) lists 4 broad areas to assess organisational effectiveness and then delves into each area in more detail. Su (2008:817) developed a list of 18 items to measure the impact of quality management practices on organisational performance using a 5-point Likert scale.

A list of 30 scale items was generated directly from the research of Dobni (2008), Karruppusami (2006) and Su (2008) and indirectly from existing literature, as expressed in the literature review of Chapter 2. Only the most relevant items as expressed in the literature were used in order to prevent reworking the same research, to verify international research in the South African context, to investigate the possibility of a gap between what was considered important by respondents and what is actually practiced in industry, and to use the research of others as a step towards consolidating this research on innovation and quality. In this study, the items were rated by the respondent on a scale of 1 to 7 where 1 was the least relevant option and 7 was the most relevant option. Two scales were rated simultaneously: 1. to what extent was the item important to the respondent and, 2. to what extent was the item practiced in the organisation, thereby presenting a gap in knowledge.

Feng (2006:270) states that high achievement was obtained through the use and implementation of both quality and innovation practices. This study investigated if this was the case by using various open ended questions where the respondent was able to express his/her own thoughts on the topic.

3.2.3 Structure of the Questionnaire

The questionnaire consisted of 3 sections which each served a different purpose.
Section 1 is basic profiling where the company name and the respondent's job title or position was required. Both were compulsory questions.

Section 2 forms the main part of the questionnaire and consists of 3 subsections. Section 2A and 2B ask original considerations on the emergence of innovation in quality from the point of view of different hierarchical levels in the organisation. These 2 subsections also very briefly explore the concept of risk as it relates to innovation and the assertion that quality and innovation together is possibly the next competitive frontier for organisations. Section 2A consisted of 11 questions seeking the importance of various concepts to the emergence of innovation in quality. Section 2B contained 11 similar questions to 2A but the questions were now based on whether the item was practiced in the organisation as opposed to if it was just important to the organisation. This section then posed another 6 questions relating directly to

the respondents experience of innovation in quality at different hierarchical levels in the organisation and in society. The different levels include the individual, groups/teams, management, the department, the organisation as a whole and government.

Section 2C sought to verify the findings of research in literature regarding innovation from a quality perspective. This section considered the top 30 constructs that were stated in literature to have the most significant effect on innovation. Each of these 30 constructs were weighed on 2 separate scales, one measured the importance to innovation and quality according to the respondent and the other measured the degree to which the variables were practiced or considered in the organisation. These 30 variables and those from the other subsections formed the basis of the proposed model. A gap for possible further research as well as an indication of the current status of innovation in quality was created by analysing the importance and practice of each item/variable. The 30 construct items will be listed in Chapter 4, along with the results.

Section 3 completed the questionnaire. Four open-ended questions on the topic were posed. The purpose of this section was to allow the respondent an opportunity to have input and offer suggestions, and to reveal areas from the respondent's personal experience from which innovation from a quality perspective can emerge.

3.2.4 Qualitative vs. Quantitative Methodology

Cooper and Schindler (2001:139) state that one of the purposes of exploratory studies is to develop concepts more clearly and that qualitative techniques are more suitable to achieve this. This study is primarily qualitative in that it seeks to explore the concepts of creativity and innovation from a quality perspective. This was achieved through a study of literature and personal interviews used in the pilot study.

Following the methodological pluralism approach described above, a quantitative component was also included through the research questionnaire. The study was quantitative in that it sought to determine the importance of the concepts of creativity and innovation from a quality perspective to ISO 9001 organisations and also how they are applied in the organisation. The responses from these two general questions were then subjected to statistical analysis.

3.2.5 Validity and Reliability

According to Cooper and Schindler (2001:211), there are two main forms of validity: external and internal validity.

External Validity

External validity refers to the propensity of the sample data to be generalised and represent the whole population (Cooper and Schindler 2001:403). External validity will be compromised if the selection of population members to be tested is not the same as the population members to which the generalised results will apply. As the design of the research instrument in this study limits the respondents to management and administrative employee levels, the results cannot be extrapolated to be a generalisation of the responses from non-administrative operational employees (for example, factory employees who do not need or have access to email).

Internal Validity

Internal validity describes the ability of the research instrument to measure what it is supposed to measure. Internal validity is divided into three parts: content validity, criterion-related validity and construct validity.

Content validity describes how well the research instrument covers the full breadth and depth of the research topic. Unfortunately, determining content validity is a judgmental activity. For this study, innovation and quality are both very broad topics. Producing the full breadth of items/variables that could possibly be explored and measured would run into a few hundred. The list is exhaustive though and further research into this area would be recommended. For this study, the research was limited to key areas by taking only the most important variables that were mentioned in previous studies on the topic. The items researched by Dobni (2008), Karruppusami (2006), and Su (2008) were included in this study as the same innovation variables seemed to be repeatedly mentioned and these researchers were quite comprehensive in their studies. The research instrument, therefore, should have good internal validity. However, two areas were not sufficiently represented in the research instrument. These were the impact of quantitative methods and the impact of administrative activities on innovation in quality. These two areas become especially important when considering the huge

administrative burden of quality compliance that companies face and the high demand for quantitative measures in the industry.

Criterion-related validity describes the ability of the criterion (the innovation variable in this case) to predict or estimate outcome. Criterion-related validity is not entirely important in this study but will be in future studies on the topic. The intention behind this study is to produce a list of variables that allow for and encourage innovation from a quality perspective. Once these variables have been determined, the next step would be to measure the extent of the cause and effect relationship of the variables. Some variables will have greater "emergence" ability than others and thus should be strategically pursued more than others. Once pursued, the stated result that is predicted needs to be achieved.

Construct validity is also measured based on judgement. Construct validity assesses if the construct is actually a measurement of the topic. Assessment of construct validity has to be grounded in empirical-based research and compared to it. Construct validity, for this study, is also fulfilled by using the empirical research of Dobni (2008), Karruppusami (2006) and Su (2008), who initially investigated the causes of innovation.

Reliability

According to Cooper and Schindler (2001:215), reliability measures the consistency of results but not the accuracy of results. Reliability is determined using Cronbach's Alpha. A high Cronbach's Alpha that is close to 1 indicates that if the research is applied again, the results will be the same. The result is therefore deemed reliable.

3.3 Research Design and Data Collection

The research design is all the tools, techniques and procedures that the researcher applies in order to collect the data and analyse it (Cooper and Schindler 2001:75).

This study is mainly qualitative and exploratory in nature with some quantitative techniques as is customary with a multi-methodology approach. The rationale for this study type is owing to the many variables and large breadth of study in quality and innovation (Cooper and Schindler

2001:139). Research in this area is very narrowly defined with many studies into the individual aspects of creativity, innovation and quality. Therefore, the nature of creativity and innovation and from where it emerges in an organisation's quality perspective still needs to be comprehensively explored, described and defined and brought into a more holistic model.

Cooper and Schindler (2001:136) state that if a study is aimed at researching "who, what, where, when, and how much" then the study is a descriptive study. The alternative study type is causal and seeks to determine cause and effect relationships between variables. The data and information used in this study is not new as it is fairly well documented in literature. The data and information, however, is applied in a new context, that being ISO 9001 companies in South Africa and is thus tested in this context. In determining the research design, the following were also considered: the research objectives; the comprehensiveness of prior research; ease of distribution, response and data collection; the nature of the results that are provisional; and the purpose of the findings, that is intended for further research to validate and quantifiably verify the integrated model but still be useful for management decision-making (Malhotra 1999:84).

The data was thus collected via a 7 point scaled questionnaire which was distributed by email to a sample of organisations that implement a quality perspective. The questions were intended to gauge the importance of various quality concepts in the emergence of creativity and innovation and if the concepts were being applied in the organisation. Organisations that have implemented the SABS ISO 9001 standard as their quality perspective were used intentionally owing to the population being very well defined and their contact details being easily available. Other than using the SABS ISO 9001 quality perspective, theoretically any type of quality perspective may be considered. Future research that will be a good extension of this study will be to test the findings across other quality perspectives and to quantify the causal relationships of the quality constructs in line with organisation strategy and innovation.

3.3.1 Target Population

The target population consisted of 450 organisations in KwaZulu Natal (KZN) South Africa who have attained the SABS ISO 9001 quality standard. The actual members of the target population were the personnel at various hierarchical levels who worked in quality and are working with, or under the direction of, the ISO 9001 quality standard. The reason for choosing

organisations that have implemented the SABS ISO 9001 quality standard is that the quality standard, and thus the quality perspective, is standardised, well defined and established in those organisations. A fairly homogenous sample group with a relatively similar understanding of quality and a quality perspective was created. Responses to the questionnaire were, therefore, adequately informed and the respondents showed a good knowledge and understanding of the quality environment and offered well-formulated opinions. These qualities made for more accurate and reliable data. Organisations implementing ISO 9001 were thus the ideal choice for research into the emergence of creativity and innovation from a quality perspective. The list of elements from which the sample is drawn is called the sample frame (Cooper and Schindler 2001:170). The list of organisations in KZN and their contact person for ISO 9001 was provided by the South African Bureau of Standards (SABS: www.sabs.co.za/ index.php?page=certifiedclients).

3.4 Sampling

According to Cooper and Schindler (2001:77), a sample is a small part of the target population that is used to represent the target population. Each person or respondent is called an element. The data that is collected from each element in the sample population is then said to represent the whole target population.

A good sample is one that is accurate and precise in its representation of the total population (Cooper and Schindler 2001:165). The accuracy of a sample is determined by the amount of systematic variance or influence in the measures that are presented. Systematic variance may occur in this study as a result of a large group of respondents at the lower levels of quality being omitted from the sample. For example, machine operators and factory employees who do not have access to email are not included in the sample. However, the target population is, most importantly, management and administration employees based on the assumption of them having a broader view and understanding of innovation and quality.

Precision describes the degree of sample error in selecting the sample members. Non-probability sampling is considered to be less precise and more subjective than the empirically based probability sampling method. However, the degree of precision required needs to be

weighed against the research objectives. The objective of the research was merely to investigate the variables that may cause the emergence of innovation in quality and to verify the variables already proposed in research. The model that is then developed will form the first completed stage of consolidating research and begins the next stage of building on the consolidated research and developing some empirical measures. The members of the sample are therefore arbitrary and results at this stage merely need to be acceptable and free from extreme variances.

The sample technique and selection was separated into two sections for this study; one related to the pilot study and the other related to the main study.

3.4.1 The Pilot Study

The purpose of the pilot study was to test and refine the research instrument and to reveal any errors, important environmental conditions or overlooked assumptions before the main study was conducted and before the distribution of the final research instrument (Cooper and Schnindler 2001:399). The pilot study took the form of a field pre-test where a sample of respondents similar to the desired respondents were used to test the questionnaire and then the questionnaire was distributed in exactly the same way as it was going to be distributed in the main study (Cooper and Schindler 2001:361). The purpose of the pilot study was not to collect data as the variables being studied were well researched in literature.

3.4.1.1 The Pilot Study: Sampling Techniques and Selection

The sampling technique and selection in the pilot study was simple convenience non-probability sampling based on geographic location and close proximity to the researcher. Cooper and Schindler (2001:166) state that the selection of elements in non-probability sampling is arbitrary and subjective. The specific type of non-probability sampling used is purposive sampling (Cooper and Schindler 2001:192). The main objective of the pilot study was to test various aspects of the research instrument (including the chosen distribution by email), to confirm inclusion or exclusion of certain concepts and to essentially refine the questionnaire for the main study. The more rigorous probability sampling technique therefore was unnecessary. The above was achieved through in-depth interrogation-style interview sessions with respondents at ISO 9001 organisations. Interviewing allowed for respondent and researcher interaction, questioning and immediate feedback. The research instrument could thus

be adjusted quickly and appropriately before further distribution. Interviews are prone to bias but the bias in this instance is not important as the process of inquiry is qualitative.

3.4.1.2 Conducting the Pilot Study

Five local SABS ISO 9001 certified organisations were used for the pilot study. Employees at different levels in the organisation and performing various functions in quality were used to pilot the study to ensure that the questionnaire was understandable to everyone. The respondents were requested to complete the questionnaire with the purpose of checking for ambiguity and offer suggestions. The respondents were then required to present other factors to do with the questionnaire design and distribution method. Comments were noted and adjustments to the questionnaire were made. Some employees not involved in quality were also used as a means to test if they were able to understand the questionnaire and what was being asked.

The pilot study was qualitative and consisted of concepts originating from the literature review. The objective of the pilot study was to eliminate any misunderstanding of the questions in the main study; to expose possible reasons for not responding to the main study with regards to the content and the distribution method; to explore the relevance of the variables within the main study and to test the distribution method. A pilot study that fulfils these objectives is consistent with Mouton (2008:103). The pilot study incorporated qualitative in-depth interviewing, surveys and questionnaires. As noted by Tosh (2006:39), in-person interviews are best for this type of study as they encourage personal interaction and participation from the interviewee/respondent. The respondent was required to complete the preliminary questionnaire during the interview. Doing so allowed the respondent to be discreetly observed. Cooper and Schindler (2001:135) phrase these types of interviews as "interrogation studies". In interrogation studies, the researcher may collect the responses in either a personal manner (such as an interview) or impersonal manner (such as via email).

The pilot study was firstly conducted in face-to-face personal interview sessions with the ISO 9001 contact person and was used to see if there was any match between the techniques, procedures and methodologies used in practice and those in academic literature (Backstrom, Larsson and Wiklund; 2009: 248). The questionnaire for the main study was adjusted according

to the feedback received from the interviews. An email version of the main study was then prepared in order to test the distribution method. The respondents for the pilot study were once again required to complete the questionnaire in its email and online form, as if it were a real situation, to test accessibility to the questionnaire and any other operational requirements that might be exposed. This approach thoroughly tested the research instrument prior to mass distribution.

According to Altman et al (2006:2) and Woken (2010:1), a pilot study is primarily aimed at testing the feasibility of a particular research plan. The aim is not necessarily to collect and interpret data as the research instrument may be incorrect and collect the incorrect data. There was also not a need to test hypotheses since this study is exploring the topic. In this study, the pilot test was used to explore the topic and to refine the questionnaire to be used in the main study. The pilot study was therefore also just a pragmatic step to thoroughly test the research instrument prior to distribution for the main study.

3.4.1.3 Results of the Pilot Study

Respondents for the pilot study were selected based on proximity. The ISO contact person of nearby ISO 9001 organisations was contacted telephonically to set up a meeting and interview session. A summary of the results of the pilot study process follows:

- Many of the contact people were initially unwilling to partake in research and a number of organisations had to be called in order to get keen and committed respondents for the pilot study. Once the commitment of the contact person was secured, a personal visit and interview session was booked. The difficulty in securing an interview meeting significantly highlighted the future need for an email strategy as an email is not as open to immediate negotiation and motivation techniques as a telephone call or a person's presence. The email sent to the respondents would thus have to be very carefully designed to ensure that the target respondent is motivated to participate and encouraged to complete the questionnaire to the end.
- Through the interview sessions, it was apparent that the grammar and question structure needed to be significantly changed as managers in quality understood what was required but administrative employees did not.

- It also became apparent that fewer employees in the manufacturing or warehouse environment had access to computers and the internet as would have been preferred. Thus, a significant group of respondents were denied access to the questionnaire unless an opportunity to respond was specifically made available to them by their managers or supervisors. Employees who were in occupations such as machine operators or warehouse/factory floor employees would be excluded.

The pilot study was deemed reliable for qualitative research in terms of credibility due to the triangulation and saturation of information between literature and the surveys conducted.

As a result of the observation above:

- The questionnaire was almost entirely reworded to suit a respondent who was untrained in the discipline of quality.
- Instead of open ended-type questions, the questionnaire was restructured to include predominantly closed ended-type rated questions, thus enabling a quick response to the option chosen. This strategy made the questionnaire faster and easier to respond to, eliminated interviewer bias and enabled responses to be quantified without questionnaire coding being necessary. A few open ended-type questions were included to allow for respondent input.
- A large number of profiling questions was removed as it was deemed sensitive and unnecessary.
- The order of the questions was rearranged to promote initial buy-in and continued commitment through to the end of the questionnaire.
- The questionnaire was significantly shortened in both length and the time it took to complete.
- The need for a short, motivational and informative explanation for the distribution email was highlighted. The number of tasks that the respondent had to complete was also minimised and separated into a number of stages and separate emails. For example, the ISO 9001 contact person was required to complete the questionnaire first. Once this had occurred, a second email was then sent requesting respondents to forward the email hyperlink to other employees in quality in order to encourage a snow ball effect. Thus, two separate stages were used instead of one. A reduced amount of information on the first

email meant that the instructions could be simplified and read quicker therefore encouraging the initial buy-in.

- It was found that the contact person for the administration of ISO 9001 consisted of people in a wide range of functions and levels in the organisation, from directors to administrator clerks, thus the snow ball strategy would encourage an even greater diversity of responses.
- The need to explore what was considered important and what was actually practised in reality was also emphasized.

3.4.1.4 Conclusion to the Pilot Study

The purpose of the pilot study was not to gather initial data but to test the research instrument and the research process thoroughly. The pilot study, in particular, revealed the weaknesses and strengths of the questionnaire and the distribution strategy. If the weaknesses proved to be substantial after the pilot study process- then an alternative strategy would have been formulated to compensate.

3.4.2 The Main Study

The main study is a cross sectional qualitative primary survey of organisations implementing a quality programme, in this case SABS ISO 9001 organisations in KwaZulu Natal. The main study was conducted using a questionnaire developed from the literature review and interview responses in the pilot study. This main study questionnaire consisted chiefly of Likert scaled questions and some open ended-type questions. A similar route had been taken by other researchers such as Mfeka (2007), Naidu (2007), and Manuel (2008). The main study survey tested the current state of creativity, innovation and quality initiatives in organisations; the practical relevance of the quality variables and determined the risk involved in implementing certain strategies. The variables were all extracted from literature through the literature review. Survey research in this study is referred to as "mail interviewing" where the survey, in the form of a questionnaire, will be emailed and the respondents will complete an online questionnaire using research tools provided by Google Docs

3.4.2.1 The Main Study: Sampling Techniques and Selection

There is much variation of opinion and evidence as to what the precise sample size should be for the main study. The sample technique used for the main study has to be suitable to cover a

broad range of topics and concepts. The sample technique for the main study is thus also non-probability, qualitative and exploratory. It is, therefore, difficult to determine what the precise sample size should be in order to obtain both a high level of accuracy, a sufficient diversity of viewpoints and sufficient redundancy of answers while still considering the homogeneity of the population. A high level of accuracy is obtained by a number of common responses that verify the responses of others. If the sample size is too large, then there is too much redundancy and thus wasted effort, time and money. If the sample size is too small, then an insufficient number of diverse responses will be received and inaccuracy ensues.

A review of literature shows that Mohamed (2002) used a sample size of 150 government divisions to explore the determinants of departmental innovation and build correlation. Kessler and Chakrabarti (1998:308) used 30 organisations for their empirical investigations. Johannessen et al. (2001:24) mailed 5584 questionnaires with a 13.5% response rate (that is, 684 questionnaires returned and usable) in their first study and 19.6% response rate in their second study (that is, 200 questionnaires returned and usable).

Cooper and Shindler (2001:164) state that the choice of sample and size needs to accurately represent the population and suggest that producing a sample size that exceeds 5% does not affect precision. Since this study is exploratory, sufficient diversity is needed to acquire a range of answers. Sufficient redundancy is also needed as similarity in answers can indicate trends and that the breadth of answers is considered. Therefore, for this study, it can be inferred that a sample size of between 5% and 15% of the total 450 organisations will provide good representation. This inference produces a sample range of between 23 organisations (5%) and 68 organisations (15%). 23 organisations and less ($\leq$5%) though is too small to fulfil the sample objective of diversity and greater than 68 organisations ($\geq$15%) and there will be too much redundancy of common answers. Bearing the above in mind, a sample size of 12% (or 54 organisations) was chosen so as to ensure sufficient diversity and redundancy of responses.

As indicated in the pilot study test, the questionnaire for the main study is to be distributed by email to minimise cost and time. The questionnaire is stored online in Google Docs. The respondents access the questionnaire via an emailed hyperlink. The respondent is then briefed on the email and requested to complete the questionnaire online. Once the questionnaire has

been completed, the respondent submits his response electronically and all data is captured in an online spread sheet which can be downloaded for analysis. Completing an online questionnaire requires the respondent to have a computer, internet access and sufficient permission to access the document.

Considering that access to the questionnaire is easily gained through email, that there is a relatively small total population for this distribution method, that a 70% response rate is required for academic credibility and that the sample method is a convenience non-probability sample, it makes sense to distribute the questionnaire to as many of the total population as possible. This will give every element an opportunity to respond and be represented in the sample of 54 organisations.

3.4.2.2 The Research Instrument and Questionnaire Design

The research instrument consists of a computer-delivered self-administered questionnaire that comprises of three main sections. Section 1 poses two questions for referencing and profiling – the name of the organisation (the reference) and the respondent's position (the respondent's profile). The respondent's position is important to determine the level of thought and opinion that is being expressed and to enable an analysis of what people think about the concepts at different levels in the organisation which is dealt with in Section 2. Section 2 is the main part of the questionnaire and deals with the importance of certain concepts and their application in quality. This section consists mainly of statements that are rated by the respondent on a scale of 1-7. The first subsection requires the respondent to rate statements about quality with respect to how important each statement, and the variable it is measuring, is to a quality perspective. The second subsection requires the respondent to rate the same concepts but with regard to how each statement, and the variable it is measuring, is practiced. The third subsection requires the respondent to rate the importance and practice of 30 concepts that are considered to be most important for the emergence of creativity and innovation from quality as expressed in literature. Section 3 consists of open-ended type questions allowing for inputs from the respondents.

3.4.2.3 The Advantages and Disadvantages of Questionnaires

Cooper and Schindler (2001) note that using questionnaires is an effective and fairly inexpensive method of collecting data from a large number of respondents and is often the only

method that is available. Some of the advantages of using the questionnaire format are that questionnaires are inexpensive, they give quick results and responses, they can be completed at the respondent's convenience, they can be completed privately and with anonymity and they give less opportunity for interviewer bias. There is also no need to compile a stock list of how many questionnaires are required in each organisation and then print and post them in batches. The main advantages of online mail interviewing via a questionnaire are respondent anonymity, confidentiality and leisureliness of response as well as low distribution cost and ease of transferability (or forwarding) to others in the organisation (Sila and Ebrahimpour 2002:904). An online questionnaire is also easier to distribute by the manager to all other potential respondents in the organisation who have an email address so as to encourage a snowball effect. Overall, an online distribution is the easiest, quickest and least expensive.

Some of the disadvantages of using the questionnaire format are that questionnaires do not allow opportunity for probing, prompting or clarification of questions and responses, they do not allow opportunity to collect additional or contextual information and they do not allow prompting and supervision and therefore partial answers are likely. Cooper and Schindler (2001:314) also mention the high non-response rate associated with mail surveys as well as limits to the amount and complexity of the information required. An email questionnaire method also loses many control aspects. For example, one cannot control who the questionnaire hyperlink gets distributed to or the attitude of the respondent prior to completing the questionnaire. The respondents are therefore considered to be self-selecting as opposed to being completely randomly selected. The major disadvantage of using online mail interviewing is lack of immediate feedback or misunderstanding of questions. Any difficulty expressed by the respondents during the pilot study was considered in the design of the questionnaire for the main study.

3.4.3 Overall Limitations of the Research Design

The research design does not provide for in-depth study or an all-inclusive study of innovation in quality. These aspects are well established in literature. This study only sets the stage for a full and complete integration of an exhaustive list of variables into a model. Although some measurement tools will be produced by this study, the task of producing measurement tools falls outside the scope of the research. The research design will merely provide a way forward

for the construct items to be empirically researched in terms of their effect on strategy and innovation. The research design does not include non-administrative employees such as factory employees but rather focuses on management, supervisory and administrative employees who are assumed to have a broader understanding and perspective of their work environment and of the concepts of innovation and quality. A separate study focusing only on operational employees in industrial-type organisations would be recommended to determine if their perspective produces any similar results. This study is also limited to organisations that have obtained the ISO 9001 quality standard. It is assumed that the results for other quality perspectives will be similar but further study into the validity of the constructs in other quality perspectives, like Total Quality Management, is recommended to verify this assumption.

3.5 Conclusion to Chapter 3

The research design and research methodology is the overall plan and execution of the plan for the research to be undertaken. In this chapter, the concept of methodological pluralism, the approach to develop a list of scale items and the balance between the qualitative and quantitative aspects of the study were discussed. The details of how the pilot study and the main study were designed and implemented to fulfil the aims of the study were discussed as well as the shortcomings, advantages and disadvantages. Chapter 4 follows with details on the collection of data and the presentation of results.

Chapter 4

PRESENTATION OF RESULTS

4 PRESENTATION OF RESULTS

This chapter presents the results and discusses the findings revealed by the questionnaire. The data collected from the responses are analysed using SPSS version 20.0 and compared with the findings in literature. The results are presented in the form of graphs, cross tabulations and other figures. Presentation of the results begins with a gap analysis and then proceeds onto a factor analysis and an analysis of the validity and reliability of each section of the study and for the overall study. The presentation then proceeds with a brief analysis of each section of the questionnaire and highlights the gaps between what is considered important to quality and innovation from the perspective of the respondents and what is practiced in industry. This is then compared to findings in literature. As a means of consolidating and summarising the findings, a model called the Q_{ic} Model is developed and proposed to assist management in their decision-making.

4.1 Gap Analysis

A gap score shows the difference between what is considered important and what is actually practiced in reality. A large gap score shows a large difference between the importance and practice of a factor item. If a factor item is considered to be important but it is not practiced in reality then a large gap score would result. A small gap score shows a small gap between the importance of a factor item and its practice. The positive value of the gap score is more important than the sign preceding the value which simply represents that the item is under or over represented in reality as compared to how important it is considered to be. The gap score is generated by analysis of the responses by SPSS (www.insights.org.uk).

4.1.1 Gap Analysis of Sections 2A (Importance) and 2B (Practice)

The gap scores for Section 2A and 2B of the questionnaire are presented in Figure 4.1 below. Section 2A considered the Importance of the factor item to the respondent and Section 2B

considered the Practice of the same factor item in industry in the respondent's opinion. In this graph, blue indicates the rating for Importance, the colour tan indicates the rating for Practice and the colour red presents the gap score between Importance and Practice for each factor item.

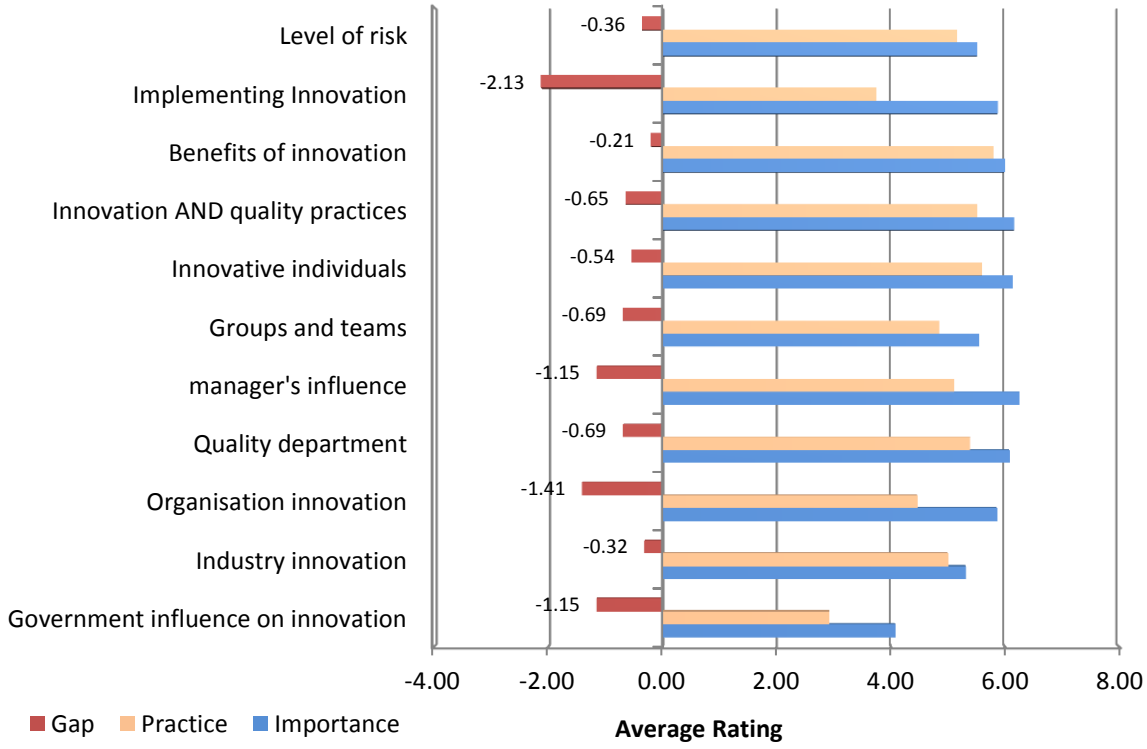


Figure 4.1: Graph showing the scores for importance, practice and the gap difference between them for Sections 2A and 2B

It is noted that the gaps were negative for all of the statements. That means, what happened in Practice was lower than the ranking offered for Importance. Gap values between 1 and 2 show a moderate difference, whilst values greater than 2 show a marked difference. Values less than 1 are less significant.

Considering the top three highest gap scores, the greatest gap between Importance and Practice is shown with "Implementing Innovation" (-2.13). So while organisations consider it important to implement innovations, this is not occurring in industry. The next greatest differences between the Importance of the item and the Practice are at organisation level "Organisation

Innovation" (-1.41), at management level "Manager's Influence" (-1.15) and at government level "Government's Influence" (-1.15) on innovation.

From the above, it can be deduced in general that innovation at the higher levels is lacking. Respondents indicated that innovation at the higher levels of the organisation are more important but are least practiced.

The next section considers the gap scores for Section 2C of the questionnaire, the factor items that have been directly researched in prior studies in literature.

4.1.2 Gap Analysis of Section 2C (Factors)

Section 2C considers both the Importance and Practice of a factor item. Figure 4.2, below, indicates the mean and gap scores for each statement in Section 2C of the questionnaire. In this graph, the colour blue indicates the rating for Importance, the colour tan indicates the rating for Practice and the colour red presents the gap score between Importance and Practice for each factor item.

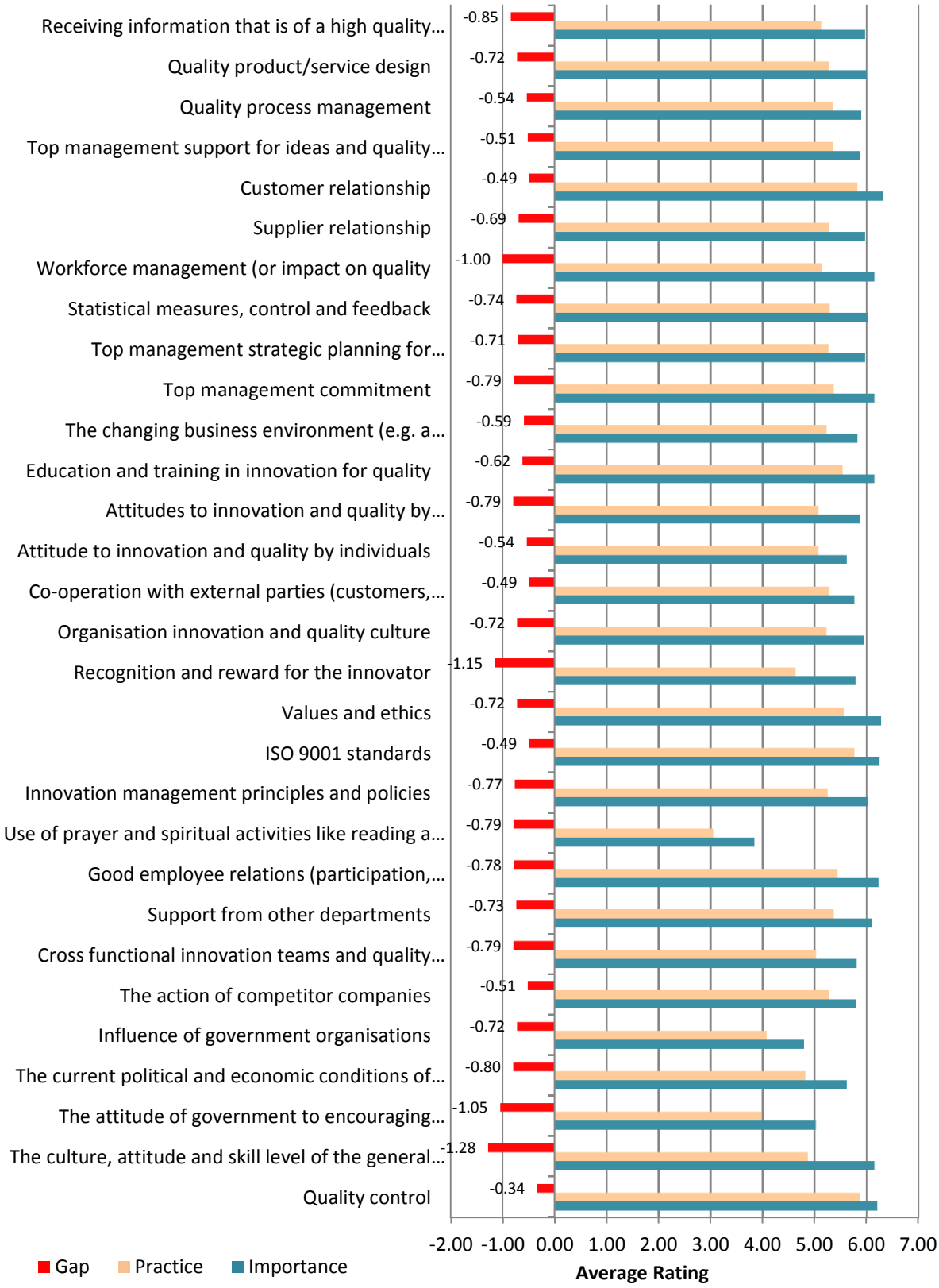


Figure 4.2: Graph showing the scores for Importance, Practice and the gap difference between them for Section 2C

As with the previous section, gap values between 1 and 2 show a moderate difference, while values greater than 2 show a marked difference. Values less than 1 are less significant. It is noted that the gaps in this section are slightly smaller than in previous sections. The reason for this may be that the majority of the concepts listed are dealt with as foundational principles in ISO 9001 compliance. As a result, the organisation may consider the item important and find itself practicing the item in its effort to comply with ISO 9001 standards. All organisations in this study are ISO 9001 certified.

The greatest differences are the "Attitude and Skill Level of the General Population" (-1.28), "Recognition and Reward for the Innovator" (-1.15) and "Government's Effort at Encouraging Innovation and Quality" (-1.05). These results suggest that the respondents place a high importance on these factor items but that their significance is not being acknowledged in practice. For example, respondents recognise that it is important for the innovator to receive recognition and reward for his innovation; however, in practice the innovator is not recognized or rewarded.

4.1.3 Gap Analysis Summary

A consolidated summary of the gap analysis of the top 3 ranked positions for Sections 2 A, B and C is presented in the following table. The factor items are ranked from greatest gap to smallest gap.

	FACTOR ITEM	SECTION
1	"Implementing Innovation" (-2.13)	A&B
2	"Organisation Innovation" (-1.41)	A&B
3	"Attitude and Skill Level of the General Population" (-1.28)	C
4	"Manager's Influence" (-1.15)	A&B
4	"Government's Influence" (-1.15)	A&B
4	"Recognition and Reward for the Innovator" (-1.15)	C
5	"Government's Effort at Encouraging Innovation and Quality" (-1.05)	C

Figure 4.3: A Summary of the Gap Scores for Sections A, B and C

It is interesting to note that the factor items that have the greatest gap score in the questionnaire can be considered infrastructure/soft factors. Thus, the factor items to do with people and culture are considered to be the most important and the least practiced. The reasons for this may be that ISO 9001 is process driven with a minor emphasis on soft factors like people management and culture. ISO 9001 addresses the need for innovation management and compliance but it does not directly address the factors that would encourage innovation. The above table thus reveals areas that need to be fulfilled in the practice of quality.

The next section presents the results of two factor analyses conducted on the questionnaire. A factor analysis groups common factor items into factor theme. The factor themes are then labelled and described.

4.2 Factor Analysis

Factor analysis is a statistical technique where the main goal is to reduce the quantity of data (website: www.stattools.net). A typical use of factor analysis in survey research is when a researcher wishes to represent a number of questions with a small number of hypothetical factors. The practice of using factor analysis is complex and comes with few definite guidelines (Costello and Osborne 2005:1; website: www.hawaii.edu). Factor techniques are applicable to a variety of situations but ultimately the goal is to study the relationships between independent and dependent variables and to group the variables according to their common theme (website: www.psych.cornell.edu). Factor analysis can be used to establish whether the extracted measures do, in fact, measure the same thing. If so, then the measures can be combined to create a new variable (www.hss.bond.edu.au; www.statstodo.com/Factor_Exp.php). The factor theme is the label that describes this new variable.

Continuing the approach of methodological pluralism, the factor analysis was conducted using two methods: 1) by using SPSS and 2) by identifying common themes found in literature. The two methods were used to countercheck each other and add a rigour and strength to the overall methodology. Each method and the respective results will be discussed separately below.

4.2.1 Factor Analysis According to SPSS

The forty one questions in this study were based on previously identified factor items found in literature. A factor analysis of the responses to the forty one questions was done by SPSS and 4 factor groups were identified. The grouping is shown in Table 4.4 below:

ITEM NO.	FACTOR ITEM DESCRIPTION	FACTOR GROUPING (THEME)
2	Implementing Innovation	1
3	Benefits of innovation	1
4	Innovation AND quality practices	1
7	Manager's influence	1
8	Quality department	1
9	Organisation innovation	1
12	High quality information	1
13	Quality product/service design	1
14	Quality process management	1
15	Top management support	1
16	Customer relationship	1
19	Statistical measures, control and feedback	1
20	Strategic planning for innovation	1
21	Top management commitment	1
22	Business environment (dynamic/stable)	1
24	Management's attitude	1
26	Open innovation (co-operation with external parties)	1
27	Organisation innovation and quality culture	1
34	Support from other departments	1
35	Cross functional teams	1
41	Quality control	1
1	Level of risk	2

5	Innovative individuals	2
6	Groups and teams	2
10	Industry innovation	2
11	Government influence on innovation	2
17	Supplier relationship	2
18	Workforce management	2
23	Education and training	2
28	Recognition and reward	2
29	Values and ethics	2
30	ISO 9001 standards	2
31	Innovation management principles and policies	2
33	Good employee relations	2
36	The action of competitor companies	2
38	The current political and economic conditions of the country	2
40	The culture, attitude and skill level of the labour in South Africa	2
32	Prayer and spiritual	3
37	Influence of government organisations	3
39	Attitude of government	3
25	Individual's attitudes	4

Table 4.4: Factor analysis grouping according to SPSS

The factor analysis table above shows the allocation by SPSS of each question (and factor item) into one of the four groups that were identified. This is summarised in the frequency table, Table 4.5, below. A description of the factor theme based on the characteristics of the factor items in the group is also presented.

FACTOR GROUP	FACTOR THEME GROUP DESCRIPTOR	TOTAL
1.000	Direct and Strategic Factors	21
2.000	Relationships and Constraining Factors	16
3.000	Esoteric/Distant Factors	3
4.000	Individual/Personal Factors	1

Table 4.5: Factor theme descriptors and number of variables per SPSS group

An analysis of the grouping of the factor items by SPSS does not show any reason as to why the respondents' answers would be grouped in this way. One possible answer may be that this factor analysis technique requires a large sample size in order for the correlations to stabilise. According to the Institute for Digital Research in Education (2013), 1 000 or more responses per variable is excellent, 500 responses is very good, 300 responses is good, 200 responses is fair, 100 responses is poor, and 50 responses is considered very poor. A bare minimum of 10 responses per variable is required for calculations (www.ats.ucla.edu/stat/spss/ output/factor1.htm). Although the response rate for this study was good at 70%, the number of responses per variable for this study lies between 10 (bare minimum) and 50 (very poor).

The number of responses, however, does not negate the fact that SPSS identified four factor groups that need to be analysed. After careful consideration of the factor items in each group, the four groups have been identified as: 1) Direct and Strategic Factors, 2) Relationships and Constraining Factors, 3) Esoteric/ Distant Factors and 4) Individual/ Personal Factors. The analysis of the groupings by SPSS will be incorporated in the discussion of the factors in the sections below.

A second method of factor analysis was used in order to strengthen confidence in, and to compare, the results of the factor groups that were identified by SPSS. The second method considered factor themes that arose in literature as identified by other researchers.

4.2.2 Factor Analysis According to Literature

Factor analysis leads and guides the researcher towards possible underlying factors that may be common to a group of variables. After taking into consideration that SPSS extracted 4 groups, and then also considering literature on the subject, the variables (or factor items) were manually arranged into 4 factor groups.

As mentioned in Section 3.2.3, Sections 2A and 2B were already separated into the three themes of risk, integrated implementation of innovation and quality and organisation levels which range from the individual through to national government. These themes and factor items were identified through a review of literature and were not directly included as part of a list of factor items that were studied directly. For example, Feng (2006:270) mentions the practice of implementing both quality and innovation simultaneously while Morris (2010:3) and Cole (2008:137) expand on the concept of risk in implementing quality. Neither of these two themes was specifically mentioned in a list of factor items that were considered to influence the emergence of creativity and innovation in literature. Despite these themes that were already identified, the factor analysis revealed other themes for which these factor items can be grouped. Factor analysis was also conducted on Section 2C which consisted of a list of variables sourced from literature that were specifically mentioned as factor items that were studied and that have an impact on creativity and innovation.

The factor analysis table below is a list of all 41 factors items that were included in this study. The list of factors thus includes the factor items that were not specifically included in a list of items in literature (that is, Section 2A and 2B) and those that were specifically identified by researchers and included in a list of factors in literature (that is, Section 2C). SPSS identified 4 factor groups (see Table 4.5) but groups were also identified separately to SPSS by considering major themes highlighted in literature. The groupings are shown in Table 4.6 below:

ITEM NO.	FACTOR ITEM DESCRIPTION	REFINED COMPONENT GROUPING
12	High Quality Information	1
13	Quality Product/Service Design	1
14	Quality Process Management	1
19	Statistical Measures, Control and Feedback	1
41	Quality Control	1
1	Level of Risk	2
4	Innovation and Quality Practices	2
7	Manager's Influence	2
8	Quality Department	2
9	Organisation Innovation	2
15	Top Management Support	2
18	Workforce Management	2
20	Strategic Planning for Innovation	2
21	Top Management Commitment	2
23	Education and Training	2
24	Management's Attitude	2
27	Organisation Innovation and Quality Culture	2
35	Cross Functional Teams	2
10	Industry Innovation	3
11	Government Influence on Innovation	3
16	Customer Relationship	3
17	Supplier Relationship	3
22	Business Environment (Dynamic/Stable)	3
26	Open Innovation (Co-Operation With External Parties)	3
36	The Action of Competitor Companies	3
37	Influence Of Government Organisations	3
38	The Current Political and Economic Conditions	3

39	Attitude of Government	3
40	Culture, Attitude and Skill Level of Labour in South Africa	3
2	Implementing Innovation	4
3	Benefits of Innovation	4
5	Innovative Individuals	4
6	Groups and Teams	4
25	Individual's Attitudes	4
28	Recognition and Reward	4
29	Values and Ethics	4
30	ISO 9001 Standards	4
31	Innovation Management Principles and Policies	4
32	Prayer and Spiritual	4
33	Good Employee Relations	4
34	Support From other Departments	4

Table 4.6: Factor analysis grouping considering themes in literature

The factor analysis table, above, groups the content of the questions into four broad groups and is indicated by the factor number and the 4 different colours. This is summarised in the frequency table below. A description of the factor theme based on the characteristics of the factor items in the group is also presented in Table 4.7 below:

FACTOR NUMBER	FACTOR THEME GROUP DESCRIPTOR	TOTAL
1.000	Core/Hard Factors	5
2.000	Management Factors	13
3.000	External Factors	11
4.000	Infrastructure/Soft Factors	12

Table 4.7: Factor theme descriptors and number of variables per SPSS group

In Section 4.2.1, a close inspection of each item in the group reveals the broad factor theme. In this section the reverse process occurred whereby the factor groups were identified through literature first and then the factor items were placed in the group. These factor groups were labelled: 1) Core/Hard Factors (statistical measures), 2) Management Factors, 3) External Factors and 4) Infrastructure/Soft Factors (e.g. organisational culture), this is supported by (Zu 2008:131). The above groupings are consistent with literature. For example, Karuppusami and Gandhinathan (2006:379) mention "the role of management leadership as a critical success factor in Total Quality Management". Each factor item was then analysed and placed into one of the four groups according to the characteristic of the concept that each factor item broadly dealt with. The factor groups could have been reduced to three groups if the group "Management Factors" was combined with the group "Infrastructure/Soft Factors". This is consistent with SPSS which also extracted 3 factors. For the sake of this study, the two groups remained separated so that the source of creativity and innovation can be identified within each.

In order to consolidate the broad themes that were identified by the two approaches, a comparison of the themes is presented below.

4.2.3 A Comparison of the Grouping of Factor Items between SPSS and Literature

Table 4.8 below shows a comparison between the factor themes of the two methodological approaches used to group the factor items, that is, SPSS and Literature. The figure in brackets after the theme descriptor is the quantity of factor items that populate the respective group. The theme descriptors have been arranged such that the best corresponding theme considered in the alternative group is adjacent to it.

FACTOR THEME DESCRIPTOR - SPSS (Total)	FACTOR THEME DESCRIPTOR - LITERATURE (Total)
Direct and Strategic Factors (21)	Core/Hard Factors (5)
Relationships and Constraining Factors (16)	Management Factors (13)
Esoteric/Distant Factors (3)	External Factors (11)
Individual/Personal Factors (1)	Infrastructure/Soft Factors (12)

Table 4.8: A Comparison of Factor Themes between SPSS and Literature

From the table above it can be seen that there is some similarity between the themes that have been identified between SPSS and those that have been identified in literature. The most dissimilar themes are Direct and Strategic Factors in the SPSS group and Core/Hard Factors in the Literature group. The balance of the groups is fairly similar to their corresponding group. It should be noted at this point that the themes in the Literature group have a better spread and are more clearly defined than themes in the SPSS group.

It should also be noted that the Institute for Digital Research in Education states that vastly different results can be obtained depending on which factor analysis technique is used. Ultimately, though, the researcher is looking for one factor that is common to all the variables in the group (www.ats.ucla.edu/stat/spss/output/factor1.htm). Owing to the similarity between SPSS themes and the themes found in literature, it may be necessary to make a choice as to which methodology best reflects reality if the two cannot be combined.

The factor themes mentioned above will be discussed in detail in an analysis of the results of the individual sections of the questionnaire to follow, that is, Sections 1, 2A, 2B, 2C and 3. The discussion will be presented from Section 4.4 of this study onwards. Validity and reliability is also incorporated in the detailed presentation of the questionnaire's sections. Validity and reliability is discussed below in Section 4.3.

4.3 Validity and Reliability

Validity and reliability describe the characteristics of sound measurement (Cooper and Schindler 2001:210). Validity describes whether the research instrument measured what it was supposed to measure and reliability describes the accuracy and precision of the research process.

4.3.1 Validity

According to Cooper and Schindler (2001:211-215), validity can be classified into 3 main forms: content validity, criterion-related validity and construct validity. All three forms of validity will be discussed in the section below.

Content validity relates to the extent that the questions in the research instrument cover the topic (Cooper and Schindler 2001:211). Content validity is a judgmental exercise and therefore it is subjective. The content of the research instrument for this study is considered highly valid as the source of the variables is from multiple studies in literature with each confirming the validity of the other studies. For example, studies by Kessler and Chakrabarti (1998:303), Karuppusami (2006:379) and Dobni (2008:542) produced similar factor items even though their studies were completely separate from each other. These factor items were considered important by the respondents thus strengthening the validity of this study.

Criterion-related validity determines the extent to which the variables are able to predict or estimate future behaviour (Cooper and Schindler 2001:213). Criterion-related validity is not directly relevant to this study as the focus of this study is to consolidate the findings in literature and to compile a conceptual model. The aim is not to develop a predictive model although this may be relevant for future studies.

The third type of validity is referred to as construct validity and it tests the abstract characteristics of a concept or variable to determine if it is valid or not. Forty one constructs are used in this study. The effect of top management, customer relationship, employee level in the organisation and the ISO 9001 standard are examples of four constructs that are tested in this study. Refer to Section 4.9 for the full Final List of Items. Construct validity for this study is determined by testing the construct item using the questionnaire distributed to the target respondents and seeing if the data gathered is similar to the data from respondents in other studies. Construct validity was also determined through the interview process of the pilot study. Construct validity is an important test in this study as each of the 41 items is tested for its relevance and validity to the South African context of SABS ISO 9001 organisations.

It can thus be seen that content validity and construct validity are the most important considerations for this study. These aspects of validity will be discussed further in Section 4.4 when the results of the different sections of the questionnaire are analysed.

4.3.2 Reliability

Reliability is important in this case as it shows that the data collected is relevant and consistent (Cooper and Schindler 2001:215). This means that if the research was conducted again, the same or very similar results would occur. Reliability is calculated by taking several measurements on the same subjects. Reliability is measured using Cronbach's Alpha. A reliability coefficient of 0.70 or higher is considered acceptable (Tavakol and Dennick 2012:54). The data collected from the questionnaire was processed using SPSS. The results for reliability for each of the sections that comprised ordinal data are presented below in Table 4.9:

	CRONBACH'S ALPHA
SECTION 2A: IMPORTANCE	0.867
SECTION 2B: PRACTICE	0.911
SECTION 2C: FACTORS	0.982
OVERALL	0.986

Table 4.9: Table showing the reliability of each section of the questionnaire

All of the categories have scores that are greater than the value of 0.7. This indicates a high degree of acceptable and consistent scoring for the different categories for this research. The content (or factor items) of this study have proven to be relevant factors in similar research on innovation and quality done by Kessler and Chakrabarti (1998:303), Karuppusami and Gandhinathan (2006:379) and Dobni (2008:542). A high degree of reliability is thus expected for this study overall.

This next section will analyse the data gathered from the responses to the questionnaire. The designations of the respondents within their organisation will be presented, as well as a factor analysis to determine the factors or constructs to be included in the final list of items that will encourage the emergence of creativity and innovation in quality.

4.4 Section 1: Reference and Designation

Section 1 included the organisation's name as a means of reference. Designations were included in Section 1 of the questionnaire so as to determine the occupation level of the respondent within the organisation. This section presents the descriptive statistics based on the demographic information of the study. The results are presented using tables and graphs. The bar graphs in Figure 4.10, below, show the number of respondents and their dispersion according to their formal designation within their organisations. The number of respondents in each designation shows which group contributed to the responses the most or if any groups were under- or over-represented.

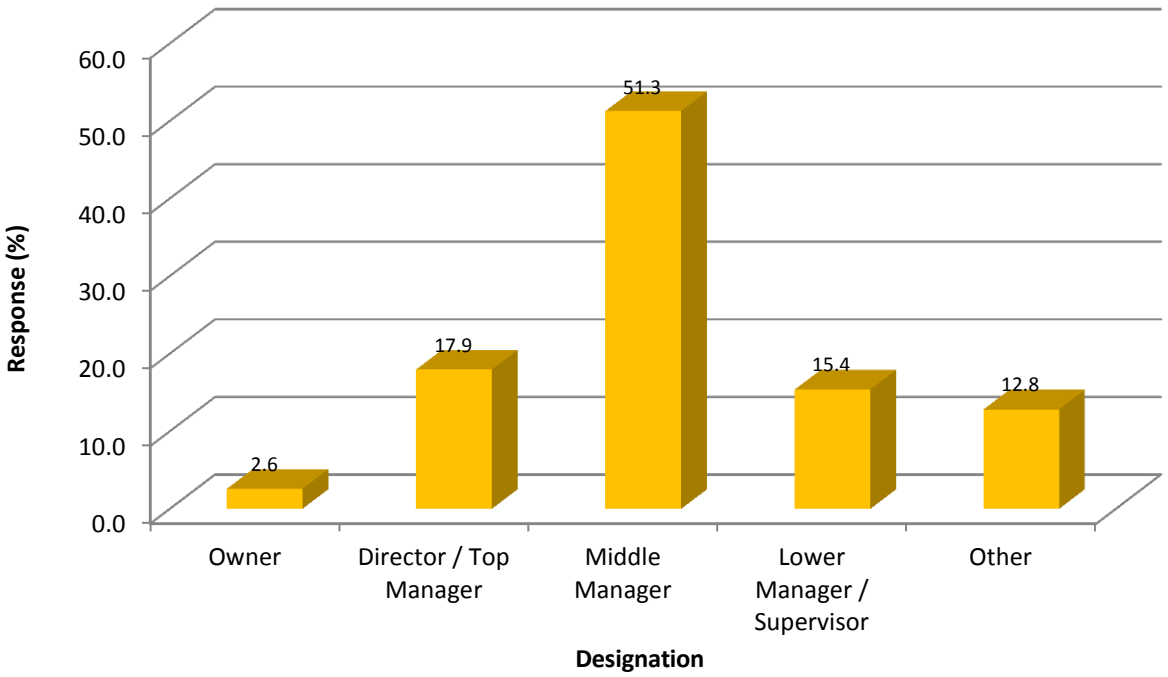


Figure 4.10: Bar graph showing the distribution of the designation of the respondents

Figure 4.10 indicates that more than half of the respondents (51.3%) were "Middle Managers". The smallest grouping was represented by owners (2.6%). The remaining respondents were "Directors/Top Management" at 17.9%, "Supervisor/Lower Management" at 15.4% and other non-management respondents at 12.8%. As a result, it was assumed that managers have the broadest knowledge and perception of quality and innovation in the organisation. Therefore, management was considered important contributors to the richness of data, both from a

quantity and quality perspective. However, it was important to include many groups and designations to have a wider perspective of quality.

4.5 Section 2: Factor Items

Two significant trends emerged from a review of literature. The first trend is that some items have been mentioned in literature as being important but have not been specifically tested or mentioned in lists in the research that was reviewed. These factor items formed Section 2A and 2B and were included as factor items in this study. The graphs in the next section indicate the frequency response percentage for each question in these two sections. Section 2A indicates, from the frequency response percentages, how important a particular variable is to the emergence of creativity and innovation in quality from the perspective of the respondent. Section 2B indicates the degree to which the variable is practiced in reality.

The second trend is that some items have been specifically identified in literature as influencing the emergence of creativity and innovation in quality. For example, the studies by Kessler and Chakrabarti (1998), Karuppusami and Gandhinathan (2006) and Dobni (2008) all included some of the factor items from this section in lists of factors that they produced. These studies, however, are detached and unrelated and need to be consolidated which is one of the objectives of this study and is considered in Chapter 5.

The factor items that have been identified form the core of this study. The presentation of results that follows discusses the frequency response, a factor analysis by SPSS, a factor analysis according to literature, and validity and reliability for Sections 2A, 2B and 2C.

4.5.1 Section 2A - Importance

Section 2A sought to determine the “Importance” of the item to the emergence of creativity and innovation in quality while Section 2B dealt with the “Practice” in the organisation of the same items mentioned in 2A. A gap analysis was then conducted by determining how “Important” a factor item was and compared it to the extent that the factor item was “Practiced” in the organisation, according to the respondent.

In Sections 2A and 2B, the specific items under study and their importance in encouraging innovation in quality are:

- Level of risk
- Implementation of ideas
- Benefits of innovation to quality
- Pursuit of both innovation and quality
- The individual
- The groups or team
- Management
- The department
- The organisation
- The industry
- Government

Each item is a factor on its own with constructs and underlying assumptions. For example, with the "Level of risk" as a factor, the underlying assumption is that too much risk will prevent the emergence and adoption of innovation; this can be supported by Morris (2010:9).

The graph below indicates the frequency responses (in percentage) of the statements that comprised Section 2A. These questions were asked so as to determine if the factor items that were suggested in literature are important. This graph is depicted below in Figure 4.11 and then explained:

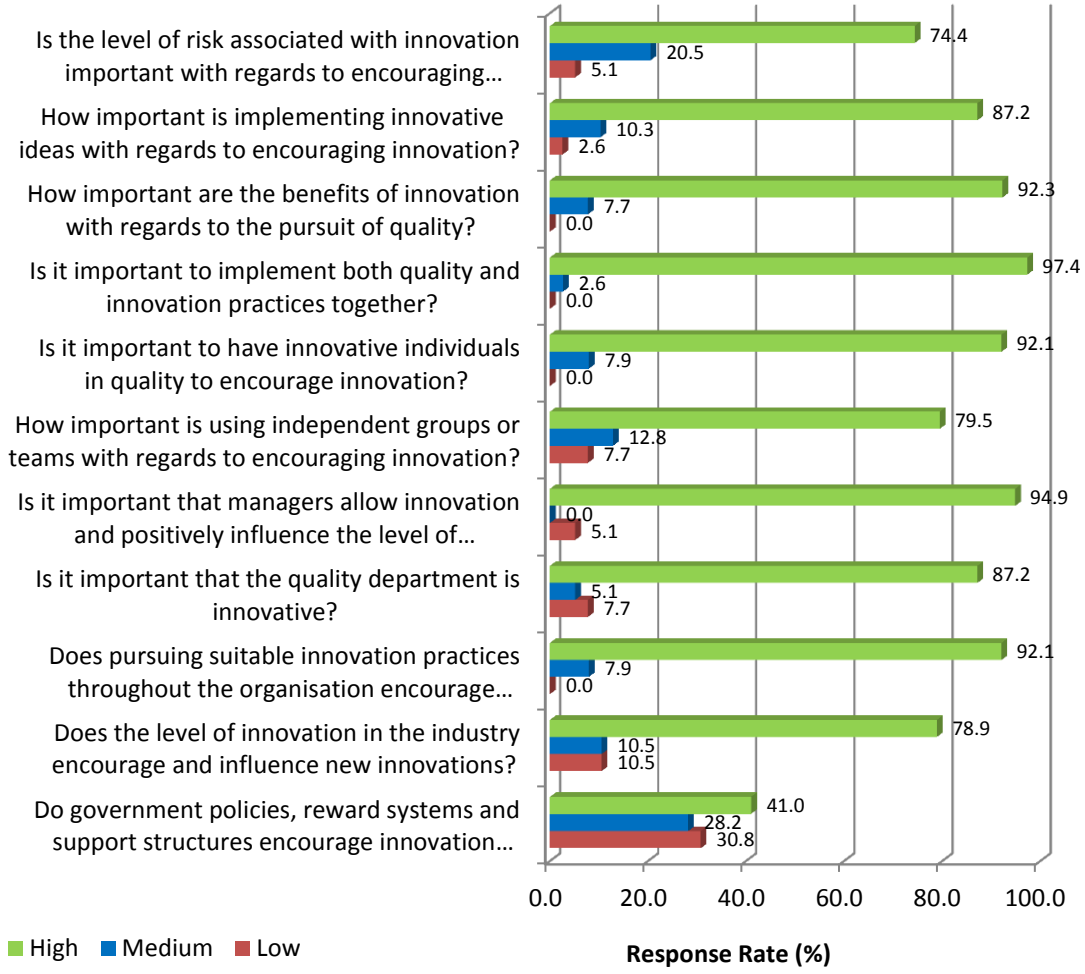


Figure 4.11: Graph showing the frequency response for Section 2A - Importance

Focusing on the factor items that fall into the top 3 ordinal positions, it is noted that there was a reasonably high level of agreement with all of the statements except for "Government Support". Therefore, "Risk" and all organisation levels from the "Individual" to "Industry" (excluding "Government") are considered to be very important in encouraging innovation in quality. A high level of agreement was expected as all the items on the list have been established in theory in Chapter 2 as being important to the emergence of innovation in quality, for example, as indicated in Zu (2008:131). "Government" scores low as the respondents may not be aware of the importance of government's role in promoting and encouraging innovation in quality, this may be supported by Goldman (2005:217). Literature and practice show that the "Role of Government" is both important and instrumental in encouraging and promoting quality and innovation, this is also consistent with Leadbeater and Meadway (2009:14),

Johannessen et al (2001:21), Drucker (2007:15), (Redshaw 2001:16). A more in depth study outside the scope of this study would need to be conducted in order to determine the root cause of the low score for Government.

It is worth noting that the ideal of implementing both quality and innovation simultaneously as an integrated approach scored the highest importance, implying that the respondents see the value in the dual goal of innovation and quality.

This section specifically deals with the factors of "Risk", "Implementation of Ideas", "Benefits of Innovation and Quality Together" and "Innovation at Various Levels in the Organisation" that have been highlighted in literature. Although these are individual factors, each can be regarded as an individual theme as well as requiring further investigation. The group of factors "Innovation at Various Levels in the Organisation" follows the theme that innovation has different sources and emerges in different ways at each level and has different levels of impact. It will be useful to do a separate study specifically on the theme of the different levels.

4.5.1.1 Factor Analysis for Section 2A

Section 2A looked at the Importance of the factor variable. The thematic grouping by SPSS was identified as "Direct and Strategic Factors", "Relationships and Constraining Factors", "Esoteric/ Distant Factors" and "Individual/ Personal Factors". Although the initial grouping of the questions was according to themes found in literature – "Risk", "Implementation of Ideas", "Benefits of Innovation and Quality Together" and "Innovation at Various Levels in the Organisation" – the themes were later refined to "Core/Hard Factors", "Management Factors", "External Factors" and "Infrastructure/Soft Factors". These themes according to SPSS and Literature will be discussed in detail in the following subsections.

Section 2A (Importance) and Section 2B (Practice) work in conjunction with each other therefore the description of the themes and a brief description of the results are presented first with a detailed analysis following in the discussion of Section 2B.

4.5.1.1.1 Factor Analysis According to SPSS

Applying the factor analysis themes grouped by SPSS to the 11 questions in Section 2A reveal that "Direct and Strategic Factors" and "Relationships and Constraining Factors" are the only two groups that are populated. This is shown in Table 4.12 below:

FACTOR THEME	FACTOR DESCRIPTION FOR SECTION 2A (%)	TOTAL
Direct and Strategic Factors	Implementing Innovation (87.2), Benefits of Innovation (92.3), Innovation and Quality Practices (97.4), Manager's Influence (94.9), Quality Department (87.2), Organisation Innovation (92.1)	6
Relationships and Constraining Factors	Level of Risk (74.4), Innovative Individuals (92.1), Groups and Teams (79.5), Industry Innovation (78.9), Government Influence on Innovation (41.0)	5
Esoteric/ Distant Factors	None	0
Individual/ Personal Factors	None	0

Table 4.12: Factor analysis table for Section 2A according to SPSS

Direct and Strategic Factors are factors that directly affect innovation and quality practices but are still of a strategic nature to the organisation. The respondents see certain strategic factors as having a direct impact on quality and innovation. Six of the eleven factors fall into this group for Section 2A.

Relationships and Constraining Factors are factors that describe a relationship and a constraint. In this group, if the variable is not functioning correctly then it places a constraint on the achievement of innovation and quality goals. For example, if risk of the innovation is considered too high then there will be less innovation occurring and thus a constraint is placed on the process.

Esoteric/ Distant Factors are factors that the respondents see as distant or obscure to innovation and quality. These factors may have an influence but the respondent deems it too distant or obscure for it to have significant impact. There is no representation of these factors in Section 2A of the questionnaire.

Individual/ Personal Factors describe factors that pertain directly to the individual's influence on creativity, innovation and quality. There is no representation of these factors in this section either. Respondents see factor 5 "Employing Innovative Individuals" more as a strategic factor than they do an individual factor or factor that pertains directly to personal factors.

In the next section, the factor analysis done by SPSS is compared to thematic groupings found in literature.

4.5.1.1.2 Factor Analysis According to Literature

Applying the factor analysis themes found in literature to Section 2A reveal that the individual factor items fit into the themes of "Management Factors", "External Factors" and "Infrastructure/Soft Factors". This is shown in Table 4.13 below:

FACTOR THEME	FACTOR DESCRIPTION FOR SECTION 2A (%)	TOTAL
Core/ Hard Factors	None	0
Management Factors	Level of Risk (74.4), Innovation and Quality Practices (97.4), Manager's Influence (94.9), Quality Department (87.2), Organisation Innovation (92.1)	5
External Factors	Industry Innovation (78.9), Government Influence (41.0)	2
Infrastructure/ Soft Factors	Implementing Innovation (87.2), Benefits of Innovation (92.3), Innovative Individuals (92.1), Groups and Teams (79.5)	4

Table 4.13: Factor analysis table for Section 2A according to literature

As mentioned previously, each factor item mentioned in the study can be considered a field of research on its own. For example, research can be dedicated to exploring "Risk" and its effect on quality and innovation or to "Organisation Innovation". Grouping the factor items through factor analysis reveals common themes in the factors as indicated in the factor analysis table (Table 4.5).

Core/Hard Factors are practices that are focused on technique, methodology and quantitative measures in quality management (Zu 2008:131). Core/Hard Factors are not represented among the eleven factors of Section 2A as all of the factor items in this section deal with qualitative measures in quality.

Management Factors are all factors related to management (Zu 2008:131; Harrington 1999). "Level of Risk", "Innovation and Quality Practices", "Manager's Influence", "Quality Department" and "Organisation Innovation" are all considered Management Factors, indicating that management has a direct responsibility in these areas.

External Factors are all those factors external to the organisation of which the organisation has little control. These factors are a part of the organisation's environment and they affect the organisation's performance (Drucker 2007; Redshaw 2001; Goldman 2005, Juran 2002). "Industry Innovation" and "Government Influence" are grouped as External Factors, indicating that these factor items are external to the organisation but still have an effect on the organisation. Infrastructure/Soft Factors are factors that have to do with organisational culture, people, management, customer and supplier relationships and the like (Zu 2008:131).

"Implementing Innovation", "Benefits of Innovation", "Innovative Individuals" and "Groups and Teams" are grouped as Infrastructure/Soft Factors, indicating that they are important within an organisation's culture.

4.5.1.2 Validity and Reliability for Section 2A

Content and construct validity is the most important validity consideration for Section 2A. The factors are largely untested in the field of quality and innovation. Literature has shown that the

content is definitely important and valid but that the factors need to be studied more formally and the constructs developed more precisely.

The reliability for Section 2A is 0.867, which is higher than the required 0.7.

	CRONBACH'S ALPHA
SECTION 2A: IMPORTANCE	0.867

Table 4.14: Reliability table for Section 2A

Section 2A scored the lowest out of the 3 sections for reliability, probably because the factors have not been significantly considered in the field of quality theory or practice and is therefore considerably diverse. Another contributor to a low Cronbach's Alpha score may be the low number of questions in this section and this is consistent with the findings of Tavakol and Dennick (2012:55).

4.5.2 Section 2B – Practice

Section 2A indicated the Importance of the factor item to the respondent. Section 2B establishes if the same factor items are practiced in the organisation. Section 2A and Section 2B therefore deal with the same factors and themes but they are approached from different perspectives of importance and practice. By determining a level of Importance and a level of Practice, a gap analysis and a detailed analysis of both the sections can be completed.

The graph below indicates the frequency responses (in percentage) of the statements that constituted this section. These questions were asked to determine if the factor items that were suggested in literature were practiced in the organisation according to the respondent. The table is depicted graphically below in Figure 4.15 and is explained later.

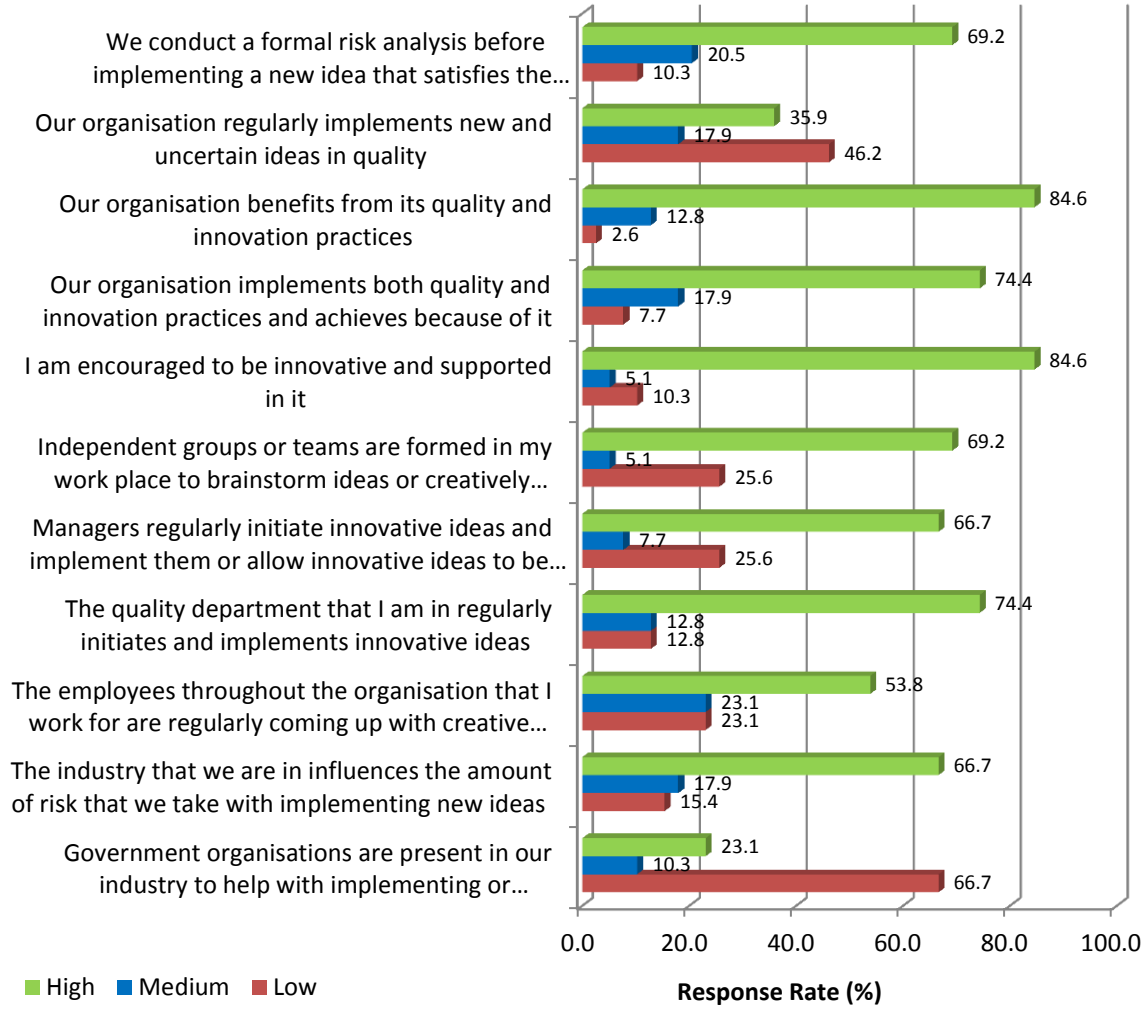


Figure 4.15: Graph showing the frequency response for Section 2B

The levels of Practice were lower than observed for Importance across all factors. This result is to be expected as the importance of the item sets the ideal which the practice attempts to fulfil. So, unless the organisation gets everything perfectly right, there will always be a negative gap.

Focusing on the factor items that fall into the top 3 ordinal positions, it should be noted that the contribution of "The Individual" is considered to be well supported at 84.6% while the use of "Groups and Teams" for innovation is less supported in practice at 69.2%. This indicates that organisations take specific action to employ creative individuals but do not significantly practice group or team techniques. Castka, Bamber, Sharp and Belohoubek (2001:123) maintain that teamwork is a critical factor in successful organisations and that individual knowledge is useless unless it is disseminated through the organisation. "Management's

Contribution" to innovation is at 66.7% whereas the importance of management's role in innovation is stated earlier as 84% (see Figure 4.6 above). This indicates that managers need to be more actively involved in the innovative process. Literature indicates the importance of management by virtue of the fact that management has the authority to lead, direct, decide and implement innovation and quality processes (Harrington 1999:5). "Government's" contribution to innovation and quality is at 23.1%. The implementation of new and uncertain ideas in quality is not well supported in practice at 35.9% even though its importance is rated at 87.2%. A gap thus exists between the importance and the practice of these items. This gap can be seen for all the items in this section.

4.5.2.1 Factor Analysis for Section 2B

Section 2B has the same factors as for Section 2A for both SPSS and for Literature. This is as a result of Section 2B investigating the same factors as Section 2A but from a "Practice" perspective (what is practiced in industry) and not from an "Importance" perspective (what the respondents consider important).

4.5.2.1.1 Factor Analysis for Section 2B according to SPSS

Below in Table 4.16 is the frequency response for the Practice of the same factor items that are represented in Section 2A and grouped according to the themes indicated by SPSS:

FACTOR THEME	FACTOR DESCRIPTION FOR SECTION 2B (%)	TOTAL
Direct and Strategic Factors	Implementing Innovation (35.9), Benefits of Innovation (84.6), Innovation and Quality Practices (74.4), Manager's Influence (66.7), Quality Department (74.4), Organisation Innovation (53.8)	6
Relationships and Constraining Factors	Level of Risk (69.2), Innovative Individuals (84.6), Groups and Teams (69.2), Industry Innovation (66.7), Government Influence on Innovation (23.1)	5
Esoteric/ Distant Factors	None	0
Individual/ Personal Factors	None	0

Table 4.16: Factor analysis table for Section 2B according to SPSS

One can compare the scoring and gaps by adding the score for each factor item in a factor theme group and then dividing the total by the number of factor items. See Table 4.17 below:

FACTOR THEME	AGGREGATE: IMPORTANCE	AGGREGATE: PRACTICE	AVERAGE GAP (%)
Direct and strategic factors	551.1	389.8	26.89
Relationships and constraining factors	365.9	312.8	10.62
Esoteric/ distant factors	0	0	0
Individual/ personal factors	0	0	0

Table 4.17: Gap analysis table for Section 2A and 2B according to SPSS factor themes

The factor scoring by the respondents shows that Direct and Strategic Factors has the greatest average difference (26.89%) between what the respondents consider to be important and what they think is actually practiced in industry. This indicates that either the respondents consider these factors to be highly important or that the factor items are not practiced sufficiently. A close inspection of the individual items in the group show that the respondents consider these factor items to be highly important and that their practice in industry is good in some instances like “Benefits of Innovation (84.6%)” and poor in other instances like “Implementing Innovation (35.9%)”.

There is less of an average difference (10.62%) between the aggregate Importance of the factor items and the aggregate Practice of those factor items in the group Relationship and Constraining Factors. This indicates that these items are practiced in industry almost to the degree that they are considered important. The reason for this result is that this group of factors is considered slightly less important by the respondents than the Direct and Strategic Factors group and these factor items are fairly well practiced in industry thereby bringing the

averages closer together. Comparing the results of these two groups it can be seen that the factors that the respondents consider to be very important, group Direct and Strategic Factors are not being focused on sufficiently in practice while the slightly lesser important factors of group Relationships and Constraining Factors are being focused on. It would appear then that industry is focusing too much on the lesser items and not enough on the major items.

It may be though that the respondents indicate the level of importance by highlighting areas that need to be focused on in the future, the items of greatest disparity between importance and practice, since the items of less disparity have been mastered. In this line of thought, the area of Relationships and Constraining Factors has been sufficiently mastered. Relationships and Constraining Factors thus become less important and that the next area of importance to focus on is Direct and Strategic Factors. In order to determine levels of importance between the different factors, each respondent would have to be asked to order the each factor item in a list from most important to least. This has been accomplished in part through the use of a Likert scale but this method is not direct and conclusive since items were not rated against each other.

Similarly to SPSS a factor analysis and a gap analysis for factor themes found in literature can be conducted.

4.5.2.1.2 Factor Analysis for Section 2B according to Literature

The frequency response for factors grouped according to themes found in literature is represented below along with the aggregate scoring for each group:

FACTOR THEME	FACTOR DESCRIPTION FOR SECTION 2B (%)	TOTAL
Core/ Hard Factors	None	0
Management Factors	Level of Risk (69.2), Innovation and Quality Practices (74.4), Manager's Influence (66.7), Quality Department (74.4), Organisation Innovation (53.8)	5
External Factors	Industry Innovation (66.7), Government Influence (23.1)	2
Infrastructure/ Soft Factors	Implementing Innovation (35.9), Benefits of Innovation (84.6), Innovative Individuals (84.6), Groups and Teams (69.2)	4

Table 4.18: Factor analysis table for Section 2B according to Literature

Core/Hard Factors are not represented in Section 2A and 2B. Management Factors have a considerably lower score for Section 2B than they do for Section 2A, indicating that management factors are considered to be very important but that they are not practiced enough in the organisation. External Factors were considered to have relatively low importance in Section 2A and the effect of the environment on innovation in the organisation is considered to be drastically less. This indicates that the respondents consider the environment to be of little practical significance to stimulating innovation. Infrastructure/Soft Factors have a fairly high score which indicates that cultural aspects to stimulating innovation are practiced. Some factors within this theme had a low score indicating that they need to be practiced to a greater extent.

Adding the score for each factor item in a factor theme group and then dividing the total by the number of factor items allows for a comparison of each group. This is shown in Table 4.19 below:

FACTOR THEME	AGGREGATE: IMPORTANCE	AGGREGATE: PRACTICE	AVERAGE GAP (%)
Core/ Hard factors	0	0	0
Management factors	446	338.5	21.5
External factors	119.9	89.8	15.05
Infrastructure/ Soft factors	351.1	274.3	19.2

Table 4.19: Gap analysis table for Section 2A and 2B according to Literature factor themes

According to the average scores shown for each theme in this group, it can be concluded that the respondents considered all factor themes (except for Core/ Hard factors) to be highly important and that the practice of the factor theme in industry was insufficient in all represented themes. Management Factors showed the largest gap (21.5%) with Infrastructure/ Soft Factors a close second (19.2%). The fact that Management Factors is extracted from Infrastructure/ Soft Factors shows the consistency between the two groups and that soft factors in general are considered important by the respondents but that they are not practiced sufficiently in industry.

4.5.2.2 Validity and Reliability for Section 2B

Section 2B measures the same constructs as Section 2A but from the perspective of the Practice of the factor item as opposed to its Importance. As with Section 2A, the most important aspects of validity are content validity and construct validity.

The reliability for Section 2B is 0.911 which is higher than the required 0.7 and slightly higher than Section 2A at 0.867.

	CRONBACH'S ALPHA
SECTION 2B: PRACTICE	0.911

Table 4.20: Reliability table for Section 2B

The data presented in this section is considered to be highly reliable and consistent. When compared to the reliability of Section 2A, it can be concluded that both Section 2A and 2B are relevant and consistent.

4.5.3 Section 2B – Additional Questions

This section attempts to determine if the respondent had personal experiences of innovation at the different levels. The reason for this section is to verify the respondent's previous responses. The questions are closed ended questions where the respondent had to simply mark a "yes" or "no" response. The table below reflects the responses given by the respondents and is depicted graphically below in Figure 4.21 and then explained:

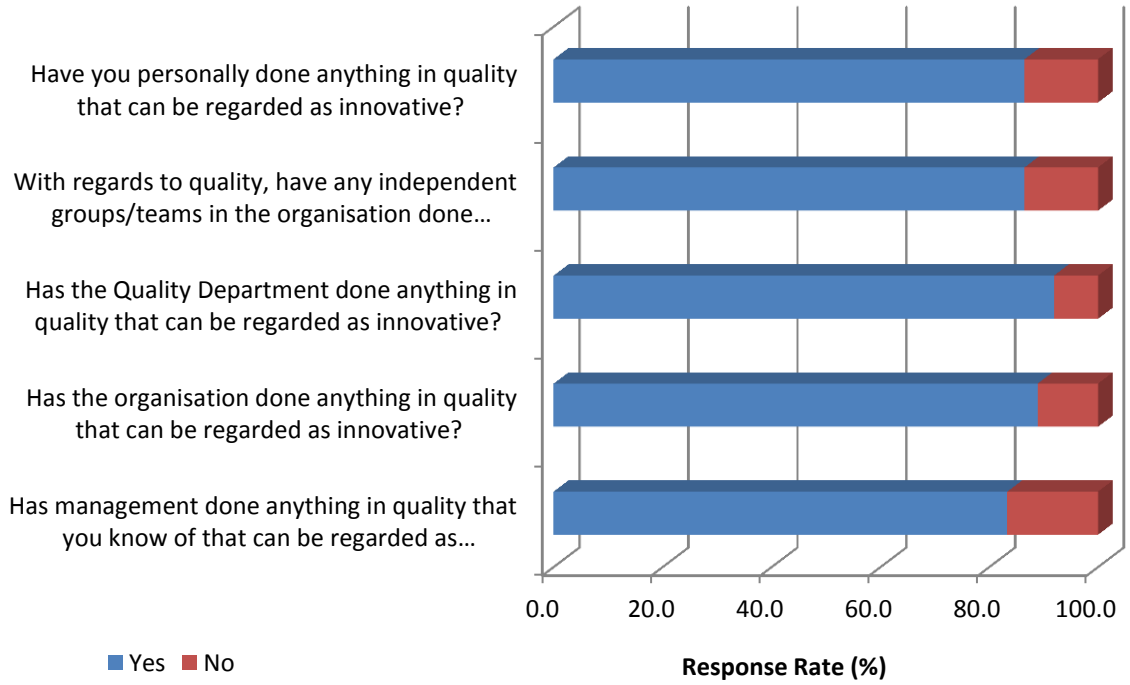


Figure 4.21: A graph showing the frequency response for the additional check questions in Section 2B

The overall response is that the majority of respondents had personal experience of innovation occurring at the different levels of the organisation and this shows that innovation is well supported. The questions were deliberately kept vague without specific examples being asked

for in order to justify the response. Only an indication was required from the respondent to see if further investigation was necessary. There is a similar scoring pattern for the various questions posed which verifies the answers given by the respondents previously in this section.

The graph in Figure 4.21 shows that the respondents were well aware of innovative practices at the different levels in the organisation. When asked about Government's support of the innovation process, 89.74% stated that Government did not assist and that Government also has not done anything innovative. These answers were consistent with the previous questions indicating that the respondents were answering the previous questions accurately and truthfully according to their perspective.

These additional questions were not included in a factor analysis or considered for reliability. The sole purpose of these questions was to validate the content of Section 2A and the previous questions in 2B.

Following from Section 2A and 2B; Section 2C deals with factor items that were specifically mentioned in literature to be important to the emergence of creativity and innovation from a quality perspective. Unlike Sections 2A and 2B which separately considered the Importance and Practice of a factor item, Section 2C considered both the Importance and the Practice of a factor item simultaneously.

4.5.4 Section 2C Factors: Importance and Practice

Section 2A considered the importance of various concepts that were referred to in literature with regard to their contribution to encouraging innovation in quality and Section 2B considered the degree to which those concepts were practiced in the organisation. Section 2C considered items that studies have specifically mentioned as being important and thus should be practiced. Both Importance and Practice are dealt with simultaneously in each question. Thirty separate factor items were considered; the results of which are presented graphically in Figure 4.22 below. The colour red indicates Importance and the colour blue indicates Practice.

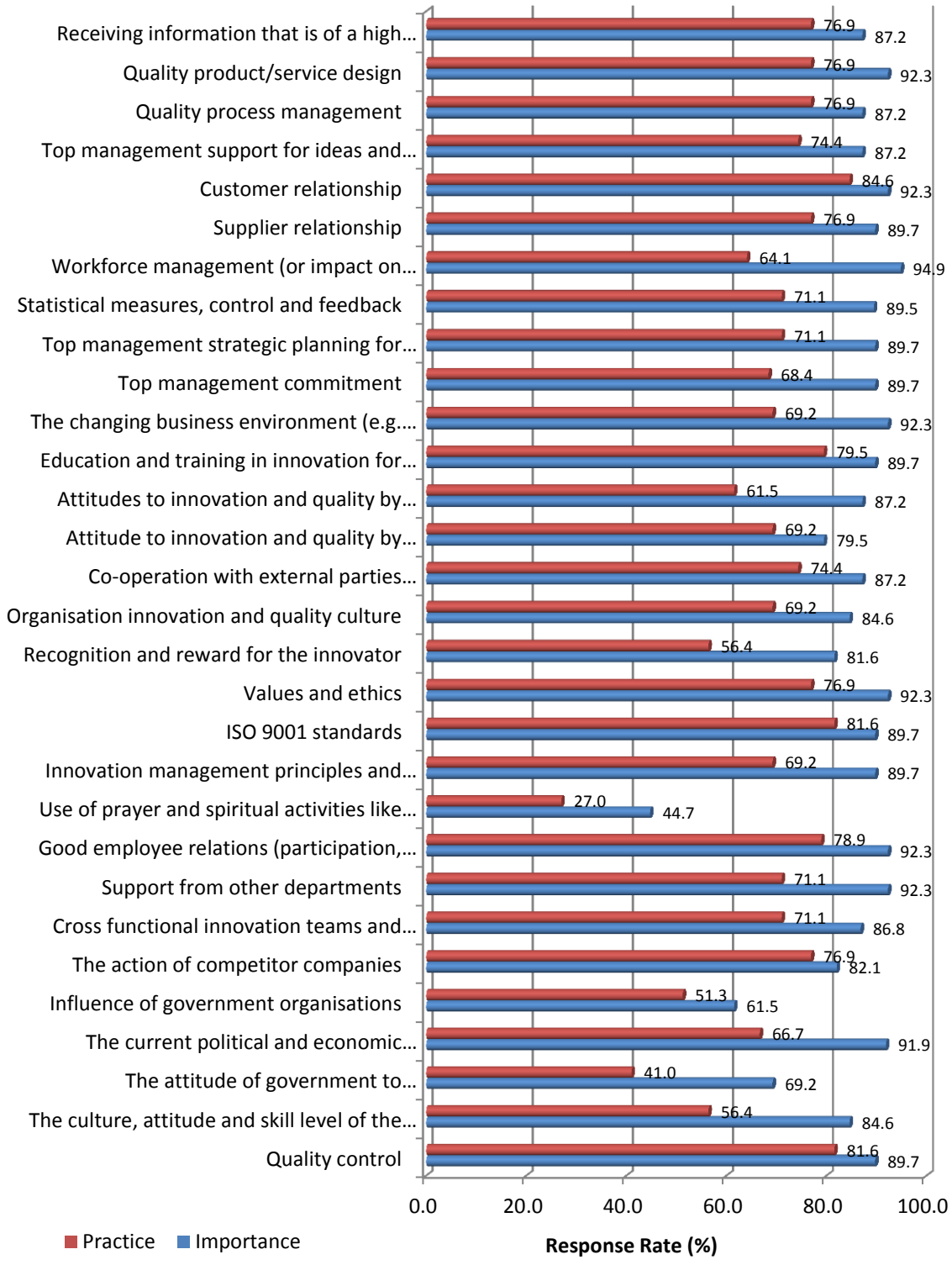


Figure 4.22: Graph showing the percentage frequency response for Section 2C Importance and Practice

Figure 4.22 indicates only the levels of high agreement with the statements for Importance and Practice. In terms of the Importance factors: Item 7 – "Workforce Management" (94.9%), is considered to be the most important factor item for the emergence of creativity and innovation. Six factor items tie for second place in the order of importance. These items are: item 11 – "The Changing Business Environment", item 23 – 'Support from Other Departments", item 2 – "Quality Design", item 18 – "Values and Ethics", item 22 – "Good Employee Relations" and item 5 – "Customer Relationship" (92.3%). The factor item that has the third highest importance is item 27 – "Political and Economic Conditions" (91.9%).

In terms of what is practiced by the organisation in reality: item 5 – "Customer Relationship" (92.3%) ranks highest for encouraging creativity and innovation. Sharing second place is item 19 – "ISO 9001 Standard" and item 30 – "Quality Control" (81.6%). Item 12 – "Education and Training" (79.5%) follows in third place. A comparison of these results to the factor analysis in Figure 4.6 shows that the infrastructure/soft quality management practices are the leading contributors to the emergence of creativity and innovation in quality in practice. Some studies show that infrastructure practices are stronger predictors of performance than core practices (Zu 2009:131)

The top 3 positions for Importance and Practice are not the same. For example, item 7 – "Workforce Management" is the highest ranking factor item for Importance and is considered to be the most important item whereas item 5 – "Customer Relationship" is the highest ranking factor item for Practice and is considered to be the most practiced factor item. These differences can be seen to continue throughout the list of the top 3 positions for Importance and Practice as can be seen in Table 4.23, below:

RANK	IMPORTANCE	PRACTICE
1	7 – "Workforce Management" (94.9%)	5 – Customer Relationship (92.3%)
2	2 – "Quality Design" 5 – "Customer Relationship" 11 – "Changing Business Environment" 18 – "Values and Ethics" 22 – "Good Employee Relations" 23 – "Support from Other Departments" (all 92.3%)	19 – ISO 9001 Standard 30 – Quality Control (all 81.6%)
3	27 – "Political and Economic Conditions" (91.9%)	12 – "Education and Training" (79.5%)

Table 4.23: List comparing the rankings of the top three factor items

In Table 4.23, the only factor item that is common between Importance and Practice is "Customer Relationship". A relationship with the customer is considered to be important for the emergence of creativity and it is practiced in the organisations as well. The difference in the list of ranked factor items between the Importance and Practice dimensions shows that there is a disparity between what the respondents consider important to the emergence of creativity and what is actually practiced.

It is noted that the Practice scores are lower than the Importance scores. It can be deduced from this that the level of importance sets the ideal that the organisation tries to practice within its constraints. In the above section, the most important factor items were highlighted and a comparison was made between what is considered important and what is actually practiced. This was limited to the top three positions for convenience.

4.5.4.1 Factor Analysis for Section 2C

The factor analysis themes in Section 2C for the 30 factor items identified in literature have been grouped in two ways: firstly, using SPSS according to the respondents' responses and secondly, according to studies found in literature.

4.5.4.1.1 Factor Analysis for Section 2C According to SPSS

The grouping according to SPSS is shown below in Table 4.24 where the response to both the Importance and the Practice of the variable is considered. Each variable is followed by two values in parenthesis. The first value is the response rating for Importance. The second value is the response rating for Practice. For example, "Top Management Support" is rated as 87.2% for Importance and 74.4% for Practice. The values in brackets are percentages.

FACTOR THEME	FACTOR DESCRIPTION FOR SECTION 2C IMPORTANCE AND PRACTICE (%)	TOTAL
Direct and strategic factors	High Quality Information (87.2 ; 76.9) Quality Product/Service Design (92.3 ; 76.9) Quality Process Management (87.2 ; 76.9) Top Management Support (87.2 ; 74.4) Customer Relationship (92.3 ; 84.6) Statistical Measures, Control and Feedback (89.5 ; 71.1) Strategic Planning for Innovation (89.7 ; 71.1) Top Management Commitment (89.7 ; 68.4) Business Environment (Dynamic/Stable) (92.3 ; 69.2) Management's Attitude (87.2 ; 61.5) Co-Operation with External Parties (87.2 ; 74.4) Organisation Innovation and Quality Culture (84.6 ; 69.2) Support from Other Departments (92.3 ; 71.1) Cross Functional Teams (86.8 ; 71.1) Quality Control (89.7 ; 81.6)	15
Relationships and constraining factors	Supplier Relationship (89.7 ; 76.9) Workforce Management (94.9 ; 64.1) Education and Training (89.7 ; 79.5) Recognition and Reward (81.6 ; 56.4) Values and Ethics (92.3 ; 76.9) ISO 9001 Standards (89.7 ; 81.6) Innovation Management Principles & Policies (89.7 ; 69.2)	11

	Good Employee Relations (92.3 ; 78.9) The Action of Competitor Companies (82.1 ; 76.9) Current Political and Economic Conditions (91.9 ; 66.7) Culture, Attitude and Skill Level of Labour (84.6 ; 56.4)	
Esoteric/ distant factors	Prayer and Spiritual (44.7 ; 27.0) Influence of Government Organisations (61.5 ; 51.3) Attitude of Government (69.2 ; 41.0)	3
Individual/ personal factors	Individual's Attitudes (79.5 ; 69.2)	1

Table 4.24: Factor analysis table for Section 2C according to SPSS

One can compare the scoring and gaps by adding the score for each factor item in a factor theme group and then dividing the total by the number of factor items. See Table 4.25 below:

FACTOR THEME	AGGREGATE: IMPORTANCE	AGGREGATE: PRACTICE	AVERAGE GAP (%)
Direct and Strategic Factors	1335.7	1098.4	15.8
Relationships and Constraining Factors	978.5	783.5	17.7
Esoteric/ Distant Factors	175.4	119.3	18.7
Individual/ Personal Factors	79.5	69.2	10.3

Table 4.25: Gap analysis table for Section 2C according to SPSS factor themes

Direct and Strategic Factors forms the largest group for Section 2C with a total of 15 variables. Direct and Strategic Factors was the largest group in Section 2A and 2B as well. The variables in this group are what the respondents consider to have a direct and strategic impact on quality and innovation. Any changes to these variables and there will be a direct effect on quality and

innovation. According to the respondents, the variables contained in this group should also be included in a strategy for quality and innovation. The average gap between the Importance and the Practice for this group is not significantly large indicating that, on a whole; the important direct and strategic variables are being practiced in industry. This result is dissimilar to Sections 2A and 2B which showed an average difference of 26.89%. The difference in the averages between the two sections may be as a result of the variables in Direct and Strategic Factors for Section 2C being similar to those required by the ISO 9001 standard. These variables are therefore already considered to be strategically important, to have direct impact on quality and required to be practiced by the ISO 9001 standard. There is no similarity between the variables in Section 2A and 2B and the ISO 9001 standard yet the respondents still considered those variables to be important to quality and innovation as well.

Relationships and Constraining Factors is the next largest group with 11 variables and are fairly close to the size of the previous group Direct and Strategic Factors. This size similarity between the two groups is also consistent with Section 2A and 2B. Similar to the previous group, the average difference between Importance and Practice is not significant and measures 17.7%. The relatively small difference between the average gap between Importance and Practice of the first two groups is also as a result of the relatively large size of the groups and the fact that averages hide the outliers or variables with a large difference.

Esoteric/ Distant Factors and Individual/ Personal Factors were not populated in Sections 2A and 2B and in Section 2C they receive the fewest variables of all four groups, 3 and 1 variable each respectively. Judging by the low Importance and Practice scores, the respondents seem to place very little value on these variables for their perceived contribution towards quality and innovation to the extent that government and spirituality play an unimportant role. This is merely the perception of the respondents and it may or may not be the case in practice. Research in this area seems to state contrary but this will be considered in the next section.

4.5.4.1.2 Factor Analysis According to Literature

The diagram below shows a factor analysis grouping according to themes found in literature for Section 2C. The factors were manually allocated to a group according to their perceived best fit.

FACTOR THEME	FACTOR DESCRIPTION FOR SECTION 2C: IMPORTANCE AND PRACTICE	TOTAL
Core/ Hard Factors	High Quality Information Quality Product/Service Design Quality Process Management Statistical Measures, Control And Feedback Quality Control	5
Management Factors	Top Management Support Workforce Management Strategic Planning For Innovation Top Management Commitment Education and Training Management's Attitude Organisation Innovation and Quality Culture Cross Functional Teams	8
External Factors	Customer Relationship Supplier Relationship Business Environment (Dynamic/Stable) Open Innovation (Co-Operation With External Parties) The Action of Competitor Companies Influence of Government Organisations The Current Political and Economic Conditions of the Country Attitude of Government The Culture, Attitude and Skill Level of the Labour Force	9
Infrastructure/ Soft Factors	Individual's Attitudes Recognition and Reward	8

	Values and Ethics ISO 9001 Standards Innovation Management Principles and Policies Prayer and Spiritual Good Employee Relations Support from Other Departments	

Table 4.26: Factor analysis table for Section 2C

From the factor analysis groupings above, it can be seen that there are less factor items in the Core/Hard Factors theme than in any other factor theme. A reason for this is that Core/Hard Factors do not rank high on the list of factor items that influence creativity and innovation.

As mentioned previously, the theme Management Factors can be grouped with the theme Infrastructure/Soft Factors as Management Factors fall under Infrastructure/Soft Factors as well. If these two factor themes are grouped together then Infrastructure/Soft Factors will have a frequency of 16, External Factors a frequency of 8 and Hard/Core Factors a frequency of 5. The high importance of soft factors in the emergence of creativity and innovation is again highlighted. This confirms the model developed by Zu (2008:137) where it is shown that Infrastructure/Soft QM practices influence the Core/Hard QM practices which ultimately affects quality performance.

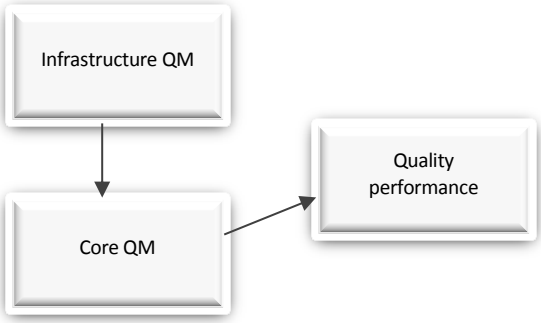


Figure 4.27: A model showing the relationship of infrastructure and core quality management practices on quality performance (Source: Zu 2008:137)

When comparing the list in Table 4.23 of factor items that rank in the top three positions for the Importance and Practice dimensions, it can be seen that, out of the eight factor items listed for Importance, only one item, item 2 – "Quality Product/Service Design" – falls into the Core/Hard Factors theme characterized by the use of statistical measures. Six items fall into the Infrastructure/Soft Factors theme characterized by organisational culture (the Management Factors theme can be included in this group) and one factor item falls into the External Factors theme relating to the organisation's external environment. Similarly, for the Practice dimension, only one factor item, "Quality Control", falls into Core/Hard Factors theme. The three remaining items fall into the Infrastructure/Soft Factors theme. From this analysis, it can be deduced that the most important contributions to encouraging creativity and innovation in quality arises from the organisation's culture (infrastructure/soft factors) and the organisation's environment (external factors). The relationship between people or groups of people is the most significant factor: "Relationship of Management with the Workforce", "Relationship with other Departments", "Relationship between Employees" and "The Relationship with Customers" are examples. These findings are synonymous with literature that tackles innovation in quality from a general or pluristic perspective although it is found that studies that are conducted within one specific perspective, like TQM or Six Sigma, which tend to reflect the patterns of that perspective.

4.5.4.2 Validity and Reliability for Section 2C

In terms of construct validity, some factor items seem conceptually close like "Work Force Management" and "Good Employee Relations", "The Changing Business Environment" and "The Current Political and Economic Environment" and "Statistical Measures, Control and Procedures" and "Quality Control". The construct validity in this section may affect the measurement of reliability. In this case, the Cronbach's Alpha would be very high if the constructs were measuring the same thing or if a high degree of reliability was obtained (www.ats.ucla.edu/stat/spss/faq/alpha.html). The meaning of each term is perceived to be different as established through the pilot study interviews conducted in chapter 3 and therefore the constructs are deemed to be valid. Content validity is also expected to be good in this section.

Tavakol and Dennick (2012:54) mention that the acceptable range for Cronbach's Alpha is between 0.70 and 0.95 with a suggested maximum Alpha of 0.90. A score greater than 0.95 suggests that some of the factor items may be redundant as the same thing is being measured but in a different way. The Cronbach's Alpha that calculates the reliability for Section 2C is very high at 0.982.

	CRONBACH'S ALPHA
SECTION 2C: FACTORS	0.982

Table 4.28: Reliability table for Section 2C

The closeness of the perceived meaning of the factor items may be the cause of such a high Cronbach's Alpha although interviews in the pilot study suggest that the similar factor items are seen as different.

4.6 Conclusion to the Factor and Gap Analysis

Using a variety of different factor techniques will cause the variables to be grouped differently. The statistical rotated component matrix analysed by SPSS and the themes found in literature were two methods used in this study. The methods are not mutually exclusive or in competition with each other to be right and prove the other method wrong. The findings of each method are used to support each other, to show another angle to the problem, as a means to dig deeper, or question a difference. As can be seen in the sections above, the different groupings reveal different characteristics of and possible reasons for the responses that need to be taken into consideration.

Ultimately it is the researcher's choice as to which method, or combination of methods, to use and to what extent; especially in a methodological pluralistic perspective such as is undertaken in this study. As revealed in Chapter 1 that the aim of this study is to consolidate and compare the findings in literature and to develop a model from literature with consideration of the theoretical findings which can be validated in practice at a later stage. To this end a greater emphasis is placed on the use of factors and themes from literature as a foundation for

consolidation and model development while the use of SPSS is simply a means to compare findings.

The next section briefly introduces the use of correlations as a statistical analysis tool in order to establish the relationship between the variables. Following correlations is a brief discussion of the questionnaire content and rational.

4.7 Correlations

Bivariate Spearman's correlation was also performed on the (ordinal) data using SPSS. The results can be found in Appendix B (see excel sheet). The variables were all taken from literature and applied to the South African context. According to Wegner (2001:316), Spearman's correlation is found by comparing 2 variables on an x- and y- axis and measuring the association between them. If the variables have a strong association then the correlation coefficient will be close to +1 or -1 (with ±1 being perfect positive or perfect negative correlation) and a weak association being close to 0 (with a value of 0 having no correlation). Spearman's correlation coefficient relates to linear relationships only.

The results indicate the following patterns:
Positive values indicate a directly proportional relationship between the variables and a negative value indicates an inverse relationship. All significant relationships are indicated by a * 95% confidence or ** 99% confidence (Wegner 2001:188).

For example, the correlation value between "How important is implementing innovative ideas with regard to encouraging innovation?" and "Is the level of risk associated with innovation important with regard to encouraging innovation?" is 0.715. This is a directly related proportionality. Respondents agree that innovative ideas, even though risky, will encourage innovation.

The correlations are interesting in two ways. The first is that the correlation can be used to research the strength of the relationship according to the opinions of the sample populations. For example: "Do government policies, reward systems and support structures encourage

innovation practices in quality?" This question scored 4.08/7 for importance, a 2.92/7 for Practice and a 0.402 correlation between its Importance and its Practice. This means that according to the opinions of South African employees in quality (particularly the managers), government intervention will not meaningfully influence the level of innovation. As we are dealing with the opinions of respondents this does not mean that government policies, reward systems and support structures do not meaningfully encourage innovation in reality. Literature contains sufficient examples to show that government activity can have a significant impact either positively or negatively (Redshaw 2001:16; Leadbeater and Meadway 2009:14; 2005:217; Juran 2002:5). The correlation also expresses the need for further research into the difference that exists between the opinions of South African organisations and well established research.

Values of low correlation (which possibly should be high) are also an important consideration. For example, the two questions "The industry that we are in influences the amount of risk that we take with implementing new ideas" and "Is the level of risk associated with innovation important with regard to encouraging innovation?" score a 0.368 at a 95% confidence interval. Respondents only somewhat agree that the level of risk in the industry influences the innovation levels of the organisation.

According to Wegner (2001:314), correlation does not imply causation. However, if two components correlate, then the relationship between them is strong. A correlation value of ±0.5 to ±1.0 is considered high in the social sciences.

A negative correlation implies that as one variable increases, the other decreases. There were no negative correlations in the data set, as expected. A full analysis of all correlations is beyond the scope of this study. It is satisfactory to show that there are differences between the correlations that show the opinions of the respondents and established research in literature.

The correlation analysis exposes where the respondents are in their thinking and implementation of innovation in quality when it is compared to literature. For example, "Implementing Innovation":

- is considered important even if it is risky (0.715 at a 95% confidence). This is a correlation between “Implementing Innovation” and “Risk”;
- encourages innovation when implemented throughout the organisation (0.744 at a 95% confidence). This is a correlation between “Implementing Innovation” and “Organisation-Level Innovation”;
- supports and encourages the individual (0.792 at a 95% confidence). This is a correlation between “Implementing Innovation” and “Individual-Level Innovation”;
- should emerge from the quality department (0.711 at a 95% confidence). This is a correlation between “Implementing Innovation” and “Depatment-Level Innovation”.

It can be deduced from the above that the respondents are strongly in favour of implementing innovation under risky conditions throughout the organisation. The respondents also strongly agree that implementing innovation encourages the individual and maintain that the quality department should take a leading role in putting it into effect. A thorough analysis of the correlations between the various factor items will reveal the strength of the relationship between the varaibles. This however is beyond the scope of this study and it will suffice to show that such a relationship will be beneficial to establish in future studies.

The next section describes the reasoning behind the content and structure of the questionnaire.

4.8 A Brief Questionnaire Review: Content and Rationale

This section reviews the questionnaire from a content perspective and substantiates why the questionnaire was structured the way it was and what it aimed to achieve.

4.8.1 Section 1 – Basic Profile

Section 1 requested the respondents’ organisation for reference purposes and their job position. The respondents’ designation will bring some understanding as to why they answered the questions as they did. For example, operational employees generally do not consider quality from a strategic point of view. Their understanding will thus be limited. In further studies, it may be beneficial to weight each question according to its relevance to the respondent’s

designation. For example, questions to do with day to day operations will receive a higher weighting if a person in an operational position responds as opposed to a person in a strategic level position.

4.8.2 Section 2A – Importance of the Item

Section 2A considered the importance of various items. One of these items is the level of risk and its effect on innovative activity. Section 2A also asked questions with regard to the emergence of innovation in quality from several organisation/societal levels. The levels ranged from the individual, groups and teams, management, the department, the organisation as a whole, the industry as a whole and government. There were no comprehensive studies in literature that discussed the levels of risk and the effects of the various levels. Some researchers did discuss these topics in passing which is why they were included in the study.

4.8.3 Section 2B – Practice of the Item

Section 2B considered the practice of the same items found in Section 2A. Once the importance of the item is established in Section 2A a gap can be established by considering if the item is practiced in industry.

To a large degree, all the items that are considered important were also practiced. As expected though, the respondents considered the practice of the item to be not as high as it is important. This can simply illustrate the fact that the respondents considered that they were not achieving what they had hoped. A cursory analysis could easily lead one to believe that the average organisation and individual who responded was close to perfect and that they existed with little to no need for government intervention.

Again, these items were indirectly found in literature and incorporated into the questionnaire.

4.8.4 Section 2C – Direct Items from Literature: Practice and Importance

This section simultaneously considered both the importance of an item and its practice in the organisation. Contrary to the two previous sections (Section 2A and 2B), Section 2C contains key items that are directly mentioned and studied in literature. The items and concepts in this section were already well established as being important to encouraging the emergence of

creativity and innovation from a quality perspective. The test was thus to see how they compared in South African organisations.

4.8.5 Section 3 – Open-Ended Questions

This section allowed for an open response to questions. This section is important in that it gives the respondents an opportunity to freely state their thoughts on issues that might or might not be covered in the questionnaire directly. An open response exposes the thoughts of the respondents and initiates an opportunity for further analysis and study. In this instance, it is also used as an opportunity to confirm or refute a concept.

According to the statements made in this section, innovation can arise from the quality perspective and the organisation in the following ways:

From the quality perspective, creativity and innovation can arise through:

- training
- management and management attitudes
- consideration of best practices (benchmarking)
- reputation
- design
- the individual
- industry players
- management systems (like 6 Sigma, ISO 9001)
- employees
- top management
- statistical measures like trend analysis and
- management tools like RCA (Root Cause Analysis)

Some items are a repeat of what was directly mentioned in the study as a specific factor item (for example: the individual, industry players and top management) and can thus be considered as a confirmation of its importance as an item to be included.

From the organisation, creativity and innovation can arise through:

- use of latest technology
- top management ideas
- employees involved with the quality management system and those that are not
- all levels in the organisation
- organisation culture
- the nature of the individual and
- the quality policy of the organisation

Organisation culture and the contribution of people (all employees and top management) featured often.

Government can play an important role in stimulating or stifling creativity and innovation in quality. The respondents suggested that government could stimulate innovation in quality by:

- relaxing the legal framework within which organisations have to operate, namely less bureaucracy, regulations and need for compliance
- appropriate legal regulations to stimulate quality and innovation
- encourage training and education in quality
- stimulate a culture of quality in the inhabitants of the country through education
- offer goal-based incentives to organisations such as awards, bursaries, grants, tenders, subsidies, tax breaks for attaining quality or for innovations
- government to meet compliance standards
- stricter regulation on imports and immigrants so as to encourage local innovation
- develop entrepreneurs
- open innovation/benchmarking with other countries (sister cities in quality and innovation)
- government and business partnerships to encourage quality and innovation

Many of the aspects mentioned above have been considered and implemented by other high performing countries, as mentioned in the literature review. Where appropriate, these items and recommendations may be included as items in the final Q_{ic} Model.

When requested to respond freely, respondents thought the following to be important considerations on innovation and quality:

- measurement is important
- continuous improvement must be a philosophy or culture
- educate and train to encourage innovation
- top management, employee and stakeholder participation
- encourage innovative designs
- media encouragement
- innovation is the competitive future and it needs to be driven by quality
- ISO 9001 has increased quality significantly
- quality/innovation must written into job descriptions
- innovation and quality is a culture
- attitude is everything

These considerations are reflected in literature and their importance and practice are reflected in this study as well.

4.9 Final List of Factor Items

The following list of items is the start of an exhaustive list of items that could be included in a model. The understanding is that all these items have an effect on the emergence of creativity and innovation in quality. No factor item from the original list has been omitted as all items have been found to be relevant to the emergence of creativity and innovation in a quality perspective. In future studies, further factor items may need to be added to the list. It would be beneficial for future studies to also establish the degree of causality and correlation for each item. By doing this, each item's contribution to strategy and best practice for innovation in quality can be determined.

The final list of items in no particular order or grouping is thus:

1. Innovation at the individual's level – Level 1
2. Innovation at the groups and teams level – Level 2
3. Innovation at the managerial level – Level 3

4. Innovation at the departmental level – Level 4
5. Innovation at the organisational level – Level 5
6. Innovation at industry level – Level 6
7. Innovation at Government level – Level 7
8. Degree of risk
9. Implementation of Innovation
10. Benefits of innovation
11. Innovation and quality practices
12. Information
13. Quality product/service design
14. Quality process management
15. Top management support of ideas
16. Customer relationship
17. Supplier relationship
18. Workforce management
19. Statistical measures, control and feedback
20. Strategic planning for innovation
21. Top management commitment
22. Business environment (dynamic/stable)
23. Education and training
24. Management's attitude
25. Individual's attitudes
26. Open innovation and benchmarking (co-operation with external parties)
27. Organisation innovation and quality culture
28. Recognition and reward
29. Values and ethics
30. ISO 9001 standards (possibly ISO standards in general)
31. Innovation management principles and policies
32. Prayer and spiritual
33. Good employee relations
34. Support from other departments
35. Cross functional teams

36. The action of competitor companies
37. Influence of government organisations
38. The current political and economic conditions of the country
39. Attitude of government
40. The culture, attitude and skill level of the general labour force in South Africa
41. Quality control

These factor items express both the hard and soft practices that will promote the emergence of creativity and innovation from a quality perspective, as mentioned in literature and verified in practice.

Taking all of the above into consideration, a model of creativity and innovation from a quality perspective can be developed. The next section thus focuses on model development.

4.10 Model Development

Cooper and Schindler (2001:52) define a model as "a representation of a system that is constructed to study some aspect of that system or the system as a whole". A model illustrates or describes a system, its processes and the relationships between the various components. A model differs from a theory in that the theory explains but the model represents even if it is used for theoretical purposes only. Models are developed for many reasons. In practice, models are developed to simplify and organize a reality that is becoming increasingly complex. Elangovan and Rajendran (2013) (www.oxbridgegraduates.com/essays/business/developing-a-conceptualm-odel-for-research.php) define some types of models that are relevant to this study as descriptive, explicative and interpretive models. A model that will be useful to creativity and innovation should seek to describe the components and the situations for innovation, explain the relationships and the circumstances involved and interpret the dynamics of the theory and make them relevant to practical situations. Ultimately, a model is formed through the researcher's knowledge and experience of the phenomenon or research problem that is shaped through the research process. Whetton (2002), as mentioned by Elangovan and Rajendran (2013)[15], describes the components for model building.

These components are:

1. Identify the constructs (what)

   This is achieved through the list of factor items and can be seen in the Q_{ic} Assessment Matrix Tool and schematically in the Composite Model of Innovation that will be addressed in Chapter 5

2. Understand the relationship between the constructs (how)

   This can be seen most significantly in the Composite Model of Innovation addressed in Chapter 5 where the relationships between the theoretical components are illustrated.

3. Identify the propositions in the relationships (why)

   This is described in the literature review and in the results of the research study. The intentions are described in the application of the Q_{ic} Assessment Matrix tool addressed in Chapter 5.

4. Identify the context of the theory (when, where and who)

   This is shown in the limitations of the model, the boundaries of its application. The Q_{ic} Model, described in the next chapter, is a strategic model and operational tool for use by managers at multiple levels, in all types of organisations (both public and private), to identify areas in quality from where creativity and innovation can emerge.

Integrating the theories and findings from literature and the research questionnaire up to this point, a summary can be developed in the form of a model. The development of the Quality, Innovation and Creativity Model – the Q_{ic} Model – where Innovation and Creativity is a function of Quality will be explained next as the model is a summary and conclusion of the research in this study. The model is useful to describe the system, its processes and the relationships between the components. Each component can form an area of focus for the emergence of innovation or for further research. As the relationships have been described, they will also be able to be quantified in further studies. Associated with the Q_{ic} Model is the Q_{ic} Assessment Matrix tool which functions as a gap analysis tool. The Q_{ic} Assessment Matrix enables managers to determine the organisation's current status on a factor item, the desired state for that item and to facilitate planning in order to achieve the desired state.

4.11 Conclusion to Chapter 4

The output of the research methodology is the presentation of the results. In this chapter, reliability and validity were discussed and the results were found to be highly reliable and the content to have high validity. An analysis of the results of each section was then presented and discussed. Frequency responses and factor themes by SPSS and Literature in particular were highlighted. Section 1 of the questionnaire was used to profile the respondent according to respondent's organisation and designation. It was found that the majority of respondents were from management. Before Section 2 was presented, a factor analysis was completed and discussed. Section 2 was divided into 3 sections. Section 2A asked questions relating to the Importance of 11 factors items. The 11 factor items were indirectly referred to in literature but not specifically studied. Section 2B asked questions relating to the Practice of the same factor items. The factor items were found to be important and practiced to a degree. Section 2B then asked some open ended questions to verify the authenticity of the responses to Sections 2A and 2B. The responses were found to be authentic. Section 2C formed the bulk of the questionnaire and posed questions relating to 30 factor items that were directly studied in literature. In each section, the factor items falling into the top three positions were discussed. These factor items were also then compared to the factor analysis. Although SPSS was used to extract the factors, only a tenuous commonality among the variables could be found and so the SPSS analysis was supported with findings from literature. Themes from SPSS and Literature showed commonality and the final choices of the researcher, bearing in mind the aims and objectives of the study, was discussed. The potential for a correlation study was discussed and a final list of 41 factor items was developed. Lastly, the development of the Q_{ic} Model and Q_{ic} Assessment Matrix tool was introduced.

In the next chapter the conclusion and recommendations stemming from the research conducted will be addressed.

Chapter 5

CONCLUSION AND RECOMMENDATION

5 CONCLUSIONS AND RECOMMENDATIONS

This chapter will discuss the findings and conclusions of the study by focusing on the major chapter headings that defined each section, namely, the literature review, the research study and the presentation of results. Key findings will be summarised in a descriptive model called the Composite Model of Innovation in Quality. Based on this model, a management tool called the Q_{ic} Model will be proposed. The way forward for future research will also be highlighted.

Quality management systems such as ISO 9001 and TQM have made a significant positive impact on the way business is conducted and the output it produces. Countries, and the lives of the average person, have benefited from a quality methodology. However, once a quality management system is established, the only competitive edge that remains is the ability and willingness of the organisation to innovate and to do this throughout all business processes for the sake of efficiency, lower costs, higher profit margins, less resources, overall improvement and greater customer satisfaction. To this end, the study sought to combine the diverse theories of quality and innovation and consolidate the information.

A review of relevant literature and an empirical study were conducted in order to determine the areas from which creativity and innovation in quality can emerge and then to determine to what extent these items are important and practiced.

5.1 Review of Literature

One of the key objectives of this study was to review literature to determine the various methods and conditions already researched that would encourage creativity and innovation in quality. The following conclusions can be drawn from the review of related literature:

A review of literature in chapter 2 shows that there is no universal definition of quality and that the term "quality management system" is generally understood but that it can materialise in many different forms. In many cases, some key industry players formed their own quality management system and compliance rules with which all their suppliers would have to conform in order to supply to them. The food industry in South Africa is an example of this reference.

Quality is governed by compliance and statistical processes even though research shows that culture plays an even more important role in both quality and innovation. For example, a statistical measure will show non-conformance of an output. The measurement therefore maintains conformance to a quality specification or will invoke reactive problem solving to fix the problem or its process. A culture of quality will encourage everyone in the organisation to focus on delivering quality output to their internal and external customers, ultimately increasing efficiency and customer satisfaction while simultaneously reducing costs and increasing the quality of life of the individual receiving the output. Add an ethos of innovation to the culture of quality and the system becomes living and dynamic and continuously improving.

The idea of innovation is not new but organisation innovation is still not practiced to a large extent. Innovation is mostly practiced in areas like product and service development and then limited to specific departments like Research and Development and or Marketing. In other instances, top management will have the responsibility of thinking up innovative practices while lower management and operational employees will be responsible for the control and practice of day-to-day activities and will have little to no innovative input into what things are done. This may be due to two reasons one being the lack of the innovative idea that all stakeholders can be involved in innovation and the quality process or it could be due to managers still having no idea how to implement and manage innovation even in first world countries like the USA and UK (Cottam et al 2008:88).

It was gathered from the literature that the reason for the reluctance of organisations to embrace innovation in quality may be due to the lack of significant management tools or a holistic theory on innovation in quality for managers to both control innovation and to encourage it. Perhaps this is so because innovation is seen as an art form full of creative and relational "fuzziness" lacking any significant cause and effect measures and empirical basis.

Quality and innovation is generally seen as the responsibility of top management or of those involved in the quality management system but quality and innovation is proven to be a function of the environment of the organisation as well. In this regard, quality and innovation can be encouraged and discouraged through inadvertent action or the lack of action. For example, it was found that quality awards, organisation quality and innovation support institutions and incentive schemes are actions that will encourage innovation and quality while bureaucracy, fear of punishment for risk taking, political unrest, ineffective group dynamics, lack of management commitment and lack of motivators will discourage quality and innovation. Quality and innovation can emerge from all levels within an organisation. It can emerge from the individual person through to the highest societal rungs of national government and international governance (for example; international trade agreements that encourage or discourage quality and innovation). In each instance, research shows that it is creativity and culture that impact innovation and quality the most.

Risk and cost were found to play large roles in pursuing and adopting innovation and quality practices; especially the cost associated with the risk. Risk, however, can be mitigated and actual and potential costs reduced. Perhaps a rule of thumb can be developed as "reduce the risk and increase the adoption of the innovation". In other words, reduce the financial and non-financial cost of implementing a suggested innovation to an area of quality and there will likely be an increase in the adoption of the innovation to the benefit of quality.

Mostly, the review of literature revealed that there is no significant comprehensive study on innovation in quality or a complete and comprehensive list of factors that affect innovation in quality. This is understandable considering that the study of creativity and innovation in quality is very broad and covers many skills and disciplines such as statistics, process engineering, risk, organisation culture, management, motivation theory, business management, finance and accounting, quality, supply chain, business and market research, human resources, operations management, and law. This is further exacerbated by the fact that there are so many different quality tools, techniques and schools of thought which cloud the topic.

Commensurate with the discussion above, the review of literature above built the conceptual and theoretical foundation for the research study questionnaire that was distributed to ISO 9001 organisations. In particular, the review of literature formed the foundation of the factor items and the factor themes.

5.2 The Research Study

The primary objective of the research study was, firstly, to gather the information from literature and then, secondly, to compare literature to what is practiced in industry. The task was not to challenge the validity of the concepts in literature but simply to establish the degree of importance of each factor item to the respondent and also to what extent the factor item is perceived to be practiced in industry. This would determine if organisations practiced creativity and innovation within their quality perspective. The research study also had the sub-objective of weighing the factors that the literature review determined were important, according to the respondents' opinion. The statistical findings thus will not influence the final list of factor items or the compilation of the model as these are both generated from a study of literature. The statistical findings will however reveal the current thought and practice of innovation and quality in South Africa, at the time of writing, and only among ISO 9001 personnel. The aim was not to create new knowledge but to combine existing knowledge in a unique way so as to create a new model and tool that will benefit industry.

Preliminary work was conducted with 5 organisations in the form of face-to-face interviews and a pilot questionnaire. The subject of the questions had previously been sourced from literature. The objective of the pilot study, therefore, was not to discover new knowledge but to determine the relevance of the concepts, to proof the questionnaire and to test the distribution method.

Several conclusions could be made from the pilot study. The concepts dealt with in the pilot study, which would then lead to the questionnaire, were all relevant. It became apparent that the structure and wording of the questionnaire had to be reworked for greater clarity and understanding. This reworking essentially shortened the questionnaire quite significantly. Piloting the distribution process also highlighted the need to change the distribution strategy so

that a higher response rate might be achieved. The changes in the questionnaire and distribution strategy proved successful. The lessons learnt through the pilot study were incorporated into the main study.

The main study was thus a refined version of the pilot study. The main study focused on the factors that would encourage creativity and innovation in quality and sought to determine, firstly, if these were important to South African organisations and, secondly, if the organisations applied these concepts.

5.3 The Results of the Research Study

The results showed that the respondents placed very high importance on soft infrastructure quality management aspects over hard core quality management tools and techniques. This was expressed in the gap analysis for both SPSS and Literature. For example, culture and top management support (soft) is considered more important to creativity and innovation in quality than statistical measurements (hard). This result is consistent with literature although individual studies tend to focus on specific areas only. The most balanced study was conducted by Zu (2008) who showed that performance in quality was a combination of both soft infrastructure and hard core practices. This model presented by Zu (2008) can be combined with the core/infrastructure quality continuum as illustrated in Figure 5.1, below:

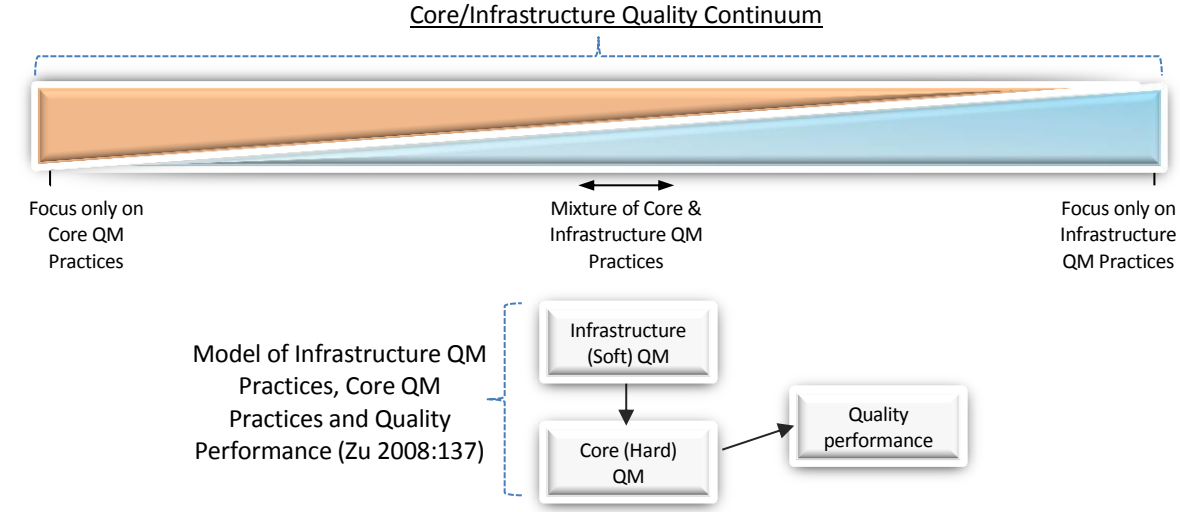


Figure 5.1: An adaptation of Zu (2008) to illustrate the quality "mix" between infrastructure and core quality management practices.

From the figure above, Zu (2008:137) suggests that infrastructure quality management has an impact on core quality management practices which then impacts on quality performance. Thus, the infrastructure practices provide the environment within which the core practices operate. In other words, both infrastructure practices and core practices are needed and the causal relationship between them can be measured. Extrapolated from this is the concept of the quality perspective continuum. Here, management can design the implementation of the organisation's quality perspective to fit along the quality perspective continuum (Figure 5.1 above) as management sees that the perspective best fulfils the organisation's needs and objectives, the needs of its customers, the demands of its internal and external environment and other objectives. Management's choice will thus affect quality performance accordingly.

Furthermore, results from the main study showed that organisations practiced the factors that literature considered are important to creativity and innovation in quality. The extent to which organisations practiced the stated factor, however, is not the same as the extent to which they considered it important, thus indicating that organisations were underperforming even according to their own standards. A more alarming result is that organisations seemed to downplay the very important role of the government and the role of the environment on creativity, innovation and quality. For example, an industry such as the Information Communication and Technology is highly competitive in terms of innovation and quality and yet respondents indicated that the environment does not affect the level of innovation and quality within the organisation. The majority of responses were from management so it can be expected that the respondents have a good understanding and an astute perception of the environment. The importance of the role of government in stimulating innovation and quality also received a very low score. These results are inconsistent with international research which shows that government and the organisation's immediate business environment play a significant role in the best performing organisations and countries.

A review of literature revealed the components of a composite model for creativity and innovation from a quality perspective (see Figure 5.2 below). The composite model for creativity and innovation in quality brings together various key research illustrating the importance of the macro environment and its impact, the immediate business environment and

its impact on the organisation, the cultural aspects of the individual organisation (including the organisation's propensity for risk), the importance of teams and the individual and the core-infrastructure quality continuum. These aspects all have a significant effect on the emergence of creativity, innovation and quality which in turn has an effect on the organisation's processes, procedures, policies, solutions and product and service offerings. The adoption of these ultimately increases economic value or utility to the unit that is adopting the innovation. Organisations will be more efficient and competitive and each citizen within the country will experience a better quality of life as a result of all these factors being pulled together appropriately into the quality perspective of an organisation.

The research found in literature is consolidated below in a composite model of innovation from a quality perspective in Figure 5.2. The model is based on a review of literature and fulfils the objective of consolidating previous research towards the development of a conceptual model.

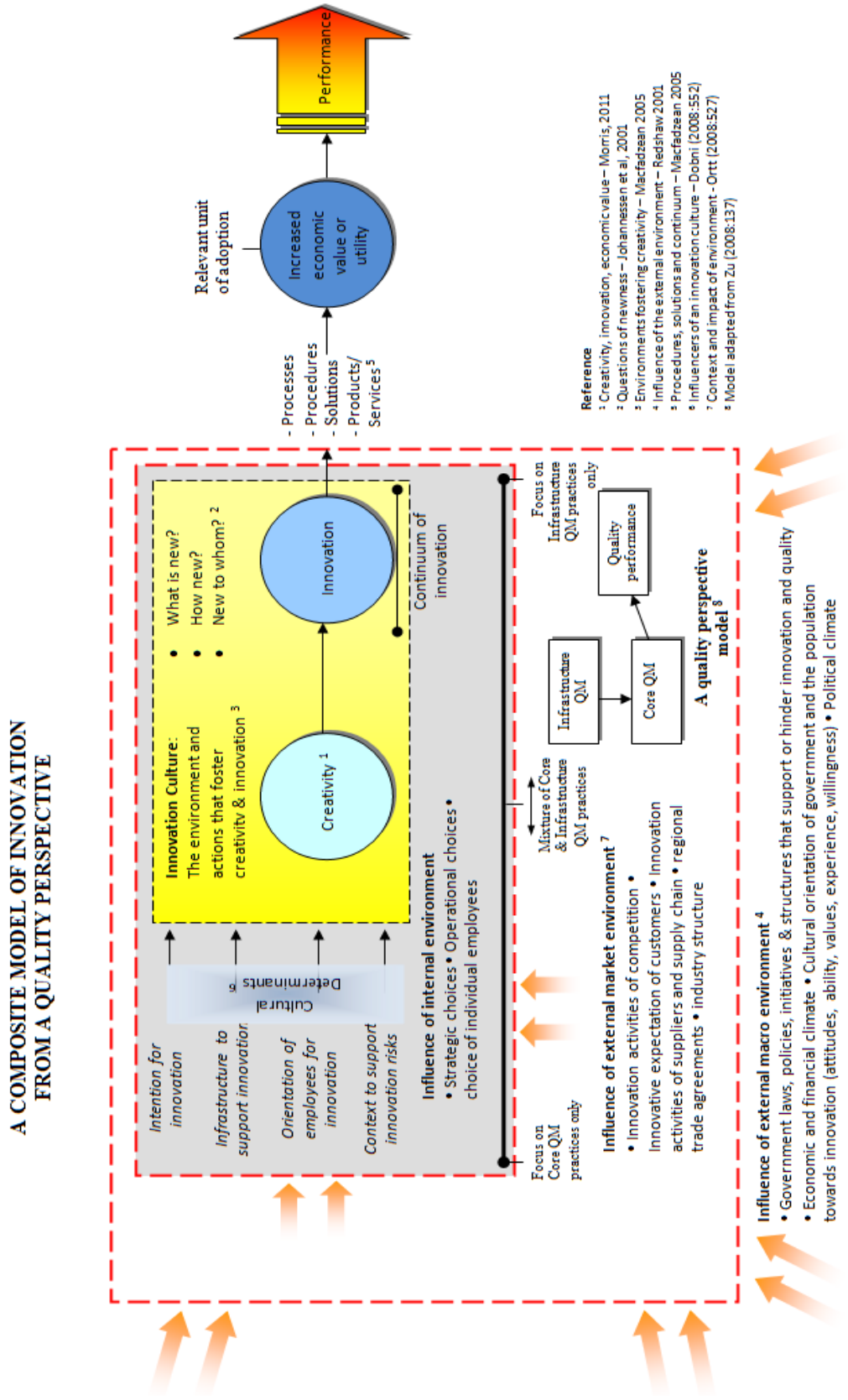


Figure 5.2: A composite model of innovation from a quality perspective (Source: adapted by the Researcher)

Drucker (2007:12) states that the only consideration left after the design of the quality perspective is that the organisation's unique quality perspective is known, communicated and deeply embedded in the ways of the organisation.

Other than the models illustrated above, the most important result is a list of 41 factor items that form the start of an exhaustive list of factor items. These factor items contribute to the strategic design and activities that should be included in a quality management system based on the greatest potential to promote the extremely competitive element of innovation. The items are extracted directly and indirectly from literature and then verified and compared through the main study.

The final list of items, in no particular order or grouping, is as follows:

1. Creative and innovative individuals
2. The use of focus groups and teams for quality and innovation
3. Supportive management
4. Departments that are focused on innovation and quality
5. An organisational approach to quality and innovation
6. The level of innovative activity in the industry
7. Government role to actively encourage and support quality and innovation
8. Propensity for risk
9. The need for the innovation to be implemented
10. The benefits of innovation
11. The synergy achieved from implementing both innovation and quality practices
12. The need for high quality information
13. Quality product/service design
14. Quality process management
15. Top management support of ideas
16. Good open customer relationships
17. Good open supplier relationship
18. Appropriate workforce management to encourage quality and innovation

19. Statistical measures, control and feedback
20. Strategic planning for innovation
21. Top management commitment
22. The nature of the business environment
23. Education and training
24. The attitude of management
25. The attitude of the individual
26. Open innovation and benchmarking
27. Innovation and quality culture throughout the organisation
28. Recognition and reward for the right behaviour and performance
29. The right values and ethics to support the pursuit of quality and innovation
30. The use of the ISO 9001 standard
31. Innovation management principles and policies
32. Prayer and spiritual activities
33. Good employee relations
34. Support from other departments
35. Cross functional teams
36. The action of competitor companies
37. Influence of government organisations
38. The current political and economic conditions of the country
39. Attitude of government
40. The culture, attitude and skill level of the general labour force in South Africa
41. The use of quality control

Each item in the list has been verified as important and practiced but the extent of each item's impact has not been determined and falls outside the scope of this study. It should be noted at this point that the above list is the same as the original list of factor items that was drawn from literature. This is expected as the concepts have been sufficiently well researched and established and the aim of the study wasn't to challenge the validity of the concepts but simply to compare the results in a unique situation.

5.4 The Q_{ic} Assessment Matrix Tool

Assimilating all of the above, a gap analysis tool can be developed. The tool is used to assess an organisation's current position on an individual item and to determine the organisation's future desired position for the same item. In so doing, management will be able to deliberately set base levels for each item and develop a strategy to move the organisation from its current state towards achieving its desired state. Conceptually, this can be illustrated as in Figure 5.3 and Figure 5.4, below.

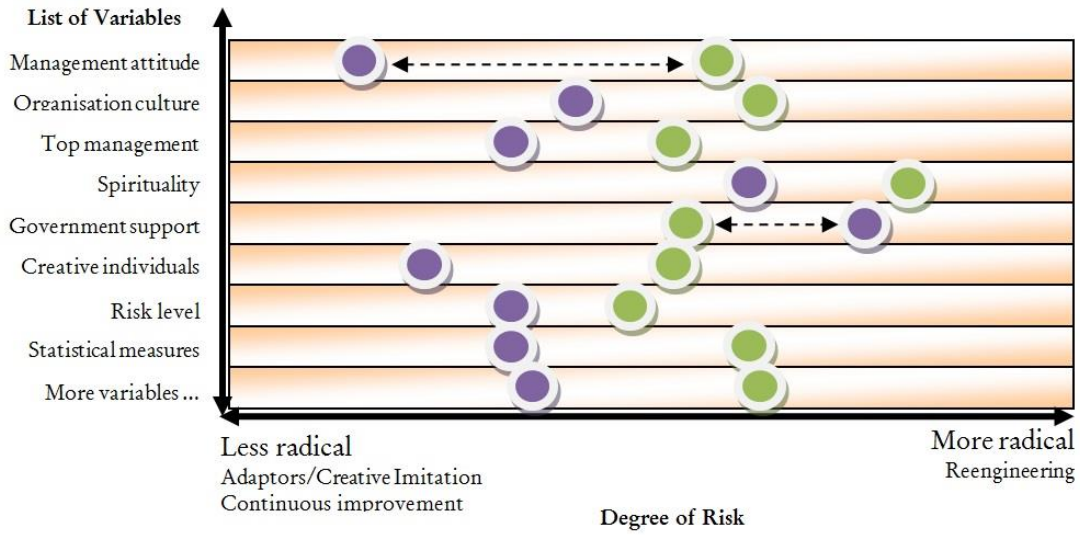


Figure 5.3: A conceptual model of the Q_{ic} Matrix (Source: adapted by the Researcher)

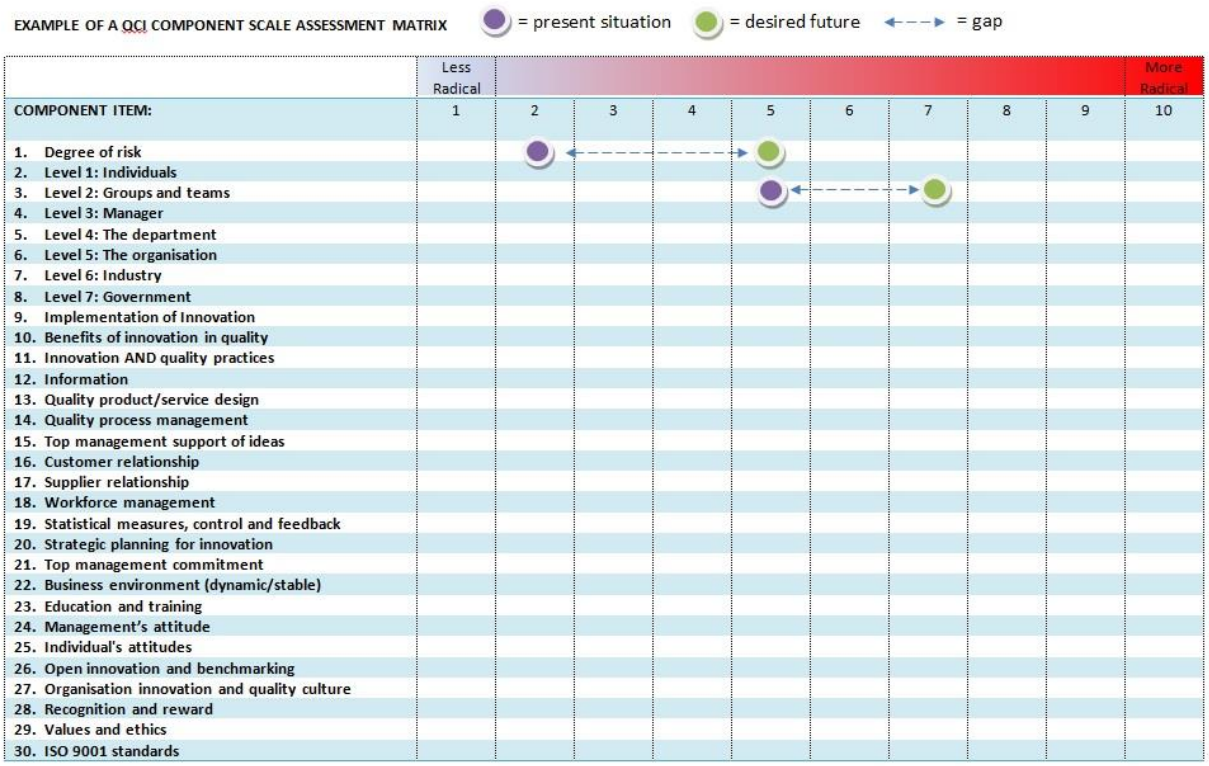


Figure 5.4: An example of the Q_{ic} Assessment Matrix tool (Source: adapted by the Researcher).

For example, Management may assess the organisation's current propensity for risk-taking, Item 1: the "Degree of Risk", has a low score of 2 and may want to move the organisation to a slightly higher level of 5 by initiating, accepting and implementing more challenging or radically innovative ideas. Management may also conclude that they would like to increase the level of creativity and innovation of the individuals (Item 2) within the organisation and so move individuals from a current score of 5 to a score of 7. This can be achieved through a specific directive to employ more creative and innovative personnel or to send current personnel on creativity training. The idea is that management will then continue down the list and assess each item for its current position and then adjust the position up or down, according to their objectives.

The Q_{ic} Matrix Assessment Tool forms part of the Q_{ic} Model explained in the next section.

5.5 The Quality Innovation Creativity (Q_{ic}) Model

The Q_{ic} Model is an integration of both the Composite Model of Innovation and the Q_{ic} Matrix Assessment tool. The Composite Model of Innovation sets the conceptual background on which the Q_{ic} Matrix is built. Both have a strong foundation in literature which fulfils the primary aim of this research study: to consolidate the findings in literature. A strong systems theory approach is followed where an adjustment in one part of the system affects every other part.

5.5.1 The Usefulness and Importance of the Q_{ic} Model

When applied to a quality perspective, the Q_{ic} Model provides a list of options and their possible effects. This list is by no means exhaustive at this point but can be built on in both breadth and depth through more extensive research; both primary and secondary. In the meantime, this study is one of the more significant attempts to pull together the diverse opportunities managers have to initiate and sustain creativity and innovation from a quality perspective.

5.5.2 The Q_{ic} Model and Primary Research

The Q_{ic} Model is useful to research current innovations in quality, to determine the effect of those components on creativity and innovation and also for management to focus their attention on particular areas for innovation. In an extended study, this model can be used to determine weighted values for each Q_{ic} Model component and develop a Q_{ic} profile for an individual, department, organisation and industry. Given sufficient time and resources, it will even be possible to determine integers for countries based on their individual cumulative industry scores.

It can be recommended that the current list of Q_{ic} factor items be extended to an exhaustive list from multiple fields and then refined to a list of the more significant items that impact on the emergence of innovation and creativity in a quality perspective. Once the full list of factor items are in place, the impact of the factors should be quantified.

5.6 Future Research

Future research should consider a more extensive list of factor items. The list should also include a more extensive list of innovation and statistical tools and techniques like open innovation and statistical process control (SPC). Each factor item, tool and model concept should be more refined and more clearly defined for the sake of measurement and comparison. Once a more extensive list of factor themes is developed, factor analysis of the all the factor items will be very useful to group factor items into factor themes. The factor themes can then be measured for their respective effect on quality performance. A causal study and a correlation study will need to be conducted to quantify the effect of factor items on quality performance and then to quantify the effect of factor themes on quality performance. A multi-methodological approach, such as the combined use of SPSS and literature in this study, is recommended. The emphasis for future study should focus on incorporating statistical measurements and factor themes into the model as it is outside the scope of this study.

Some quality perspectives like Total Quality Management focus quite heavily on the organisation's cultural aspects and also have some of their own tools and techniques. These need to be extracted from the perspective as far as possible and made available for use in a general quality and innovation perspective. The role that government can and should play in stimulating innovation and quality needs to be investigated. A report on best international practices in quality and innovation from a country perspective and in organisations should be developed as well as how the practices can be put into effect in any country. The economic and social impact of quality and innovation, separately and together, should be investigated. Future studies must include a greater representation from the other occupation levels within quality.

5.7 Conclusion to Chapter 5

The study conducted sought to solve two problems 1) to capture how creativity and innovation emerges in a quality perspective while considering the element of risk associated that may be associated with a particular course of action, and 2) to bring together the diverse theories in literature of creativity and innovation in the field of quality.

1. To capture how creativity and innovation emerges in a quality perspective.

   This was fulfilled by developing a list of 41 factor items in the field of quality that affect the practice of creativity and innovation by stimulating or preventing it. The risk factor is fulfilled in the Q_{ic} Matrix Assessment tool as the tool considers the degree of change required to implement a chosen course of action.
2. To bring together the diverse theories in literature of creativity and innovation in the field of quality.

   Relevant concepts, models and research in the field of quality was extensively discussed in the literature review. From the literature review a list of 41 factor items was developed. These factor items were consolidated into the Q_{ic} Matrix Assessment tool and forms the basis of a future statistical model. The concepts, models and research were also consolidated to form the Composite Model of Innovation in a Quality Perspective.

In solving the above two problems, the aims and objectives of the study was fulfilled completely. The aim of the study was:

1. To consolidate the findings in literature

   This is fulfilled through the Composite Model of Innovation in a Quality Perspective and the Q_{ic} Matrix Assessment.
2. To compare the findings in literature though an empirical study to quality practices in industry

   This comparison of findings in literature to industry practices was fulfilled through the research questionnaire which was developed from literature and then distributed to ISO 9001 certified organisations for response. The comparison was fulfilled a second time by a statistical analysis of the responses to the questionnaire which was then compared to findings in literature. For example, responses showed that the activities of government had little effect on quality according to the respondent. Contrary to the responses, literature shows that government activity can have a huge impact on quality. The comparison aim was fulfilled in a third way through the comparison of factor themes highlighted from the responses from industry by SPSS and the factor themes found in literature. A comparison was conducted in fifth way by using a gap analysis that compared the factor items that industry practitioners considered important to the extent that the factor items were practiced.

It can thus been seen that the problems have begun to be solved with the first attempt at unifying theory into composite models, comparing theory to industry practice, developing a list of factor items for creativity and innovation, and making theory explicit by developing tools that management can use. The problems will be further solved when the impact of each factor item and factor theme on quality is measured in future studies. The aims and objectives as described in Section 1.2 have thus been fulfilled completely. This study purposefully had a heavy reliance on literature to form the basis of a theoretical model. Future research will utilize statistical techniques to a greater degree and incorporate the results, in a variety of ways, into a model of creativity and innovation from a quality perspective (Q_{ic} Model).

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7 APPENDIX A: RESEARCH QUESTIONNAIRE

RESEARCH QUESTIONNAIRE

If you have trouble viewing or submitting this form, you can complete it online by clicking here

This questionnaire will take about 15 minutes to complete.

PLEASE ANSWER AS OPENLY AND HONESTLY AS POSSIBLE.

Please answer from your own personal perspective in the organisation. Answer as a Manager if you are a Manger, as a Clerk if you are a Clerk, or as a Director if you are a Director.

Three important concepts:

1. Organisation: the business, company, entity that you (the respondent) are currently working for or are involved in.
2. Innovation: something new or different to the organisation. This could be a new idea, process, procedure, solution or product/service that is intended to benefit the organisation.
3. Quality perspective: the organisation's particular view and interpretation of quality.

Thank you for participating.

- SECTION 1 - REFERENCE

1. What is the name of the organisation that you are currently involved in? * This is a compulsory question and used to reference the questionnaire only

Answer:

2. What is your job title or position? * This is a compulsory question and used to reference the questionnaire only

Answer:

- SECTION 2: QUESTIONNAIRE

Instruction: The questionnaire comprises 3 sections that consist predominantly of short statements that need to be rated on a scale of 1-7 according to their importance and the extent to which they are practiced.

  - SECTION 2A - Importance of the Factor

Instruction: To what extent do the following statements encourage creativity and innovation in quality? Please rate the statements on a scale of 1-7 where 1 = the least IMPORTANT and 7 = the most IMPORTANT.

A1) Is the the level of risk associated with innovation important with regards to encouraging innovation

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A2) How important is implementing innovative ideas with regards to encouraging innovation

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A3) How important are the benefits of innovation with regards to the pursuit of quality

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A4) Is it important to implement both quality and innovation practices together

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A5) Is it important to have innovative individuals in quality to encourage innovation

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A6) How important is using independent groups or teams with regards to encouraging innovation

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A7) Is it important that managers allow innovation and positively influence the level of innovation

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A8) Is it important that the quality department is innovative

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A9) Does pursuing suitable innovation practices throughout the organisation encourage innovation

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A10) Does the level of innovation in the industry encourage and influence new innovations

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

A11) Do government policies, reward systems and support structures encourage innovation practices in quality

	1	2	3	4	5	6	7	
Least Important	( )	( )	( )	( )	( )	( )	( )	Most Important

- SECTION 2B - The Factor in Practice

Instruction: Are the following statements about creativity and innovation in quality PRACTICED in reality? Please rate the statements on a scale of 1-7 where 1 = not PRACTICED and 7 = highly PRACTICED.

a) We conduct a formal risk analysis before implementing a new idea that satisfies the organisations quality requirements

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

b) Our organisation regularly implements new and uncertain ideas in quality

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

c) Our organisation benefits from its quality and innovation practices

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

d) Our organisation implements both quality and innovation practices and achieves because of it

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

e) I am encouraged to be innovative and supported in it

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

f) Independent groups or teams are formed in my work place to brainstorm ideas or creatively solve problems related to quality

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

g) Managers regularly initiate innovative ideas and implement them or allow innovative ideas to be initiated and implemented

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

h) The quality department that I am in regularly initiates and implements innovative ideas

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

i) The employees throughout the organisation that I work for are regularly coming up with creative and innovative ideas that affect quality

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

j) The industry that we are in influences the amount of risk that we take with implementing new ideas

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

k) Government organisations are present in our industry to help with implementing or stimulating quality and innovation practices

	1	2	3	4	5	6	7	
Not Practiced	( )	( )	( )	( )	( )	( )	( )	Highly Practiced

l) Have you personally done anything in quality that can be regarded as innovative?
( ) Yes ( ) No

m) With regards to quality, have any independent groups/teams in the organisation done anything that you know of that can be regarded as innovative?
( ) Yes ( ) No

n) Has the Quality Department done anything in quality that can be regarded as innovative?
( ) Yes ( ) No

o) Has the organisation done anything in quality that can be regarded as innovative?
( ) Yes ( ) No

p) Has management done anything in quality that you know of that can be regarded as innovative?
( ) Yes ( ) No

q) Has government done anything that you know of that can be regarded as stimulating innovation and quality? Please answer YES or NO. If yes then please briefly mention what it was
Answer:

- SECTION 2C - Factor Importance and Practice

Instruction: Below is a list of 30 items, for each item please respond on a scale of 1-7 (1 = least and 7 = most). On the scale labeled IMPORTANT indicate: To what extent each item is important to encouraging creativity and innovation in quality? On the scale labeled PRACTICED indicate: To what extent each item is being practiced in your organisation?

1a) Receiving information that is of a high quality standard - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

1b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

2a) Quality product/service design - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

2b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

3a) Quality process management - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

3b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

4a) Top management support for ideas and quality initiatives - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

4b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

5a) Customer relationship - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

5b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

6a) Supplier relationship - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

6b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

7a) Workforce management (or impact on quality) - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

7b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

8a) Statistical measures, control and feedback - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )

8b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7
PRACTICED	( )	( )	( )	( )	( )	( )	( )

9a) Top management strategic planning for innovation and quality - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )

9b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7
PRACTICED	( )	( )	( )	( )	( )	( )	( )

10a) Top management commitment - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )

10b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7
PRACTICED	( )	( )	( )	( )	( )	( )	( )

11a) The changing business environment (e.g. a dynamic changing environment or a relatively stable static one) - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )

11b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7
PRACTICED	( )	( )	( )	( )	( )	( )	( )

12a) Education and training in innovation for quality - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

12b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

13a) Attitudes to innovation and quality by management - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

13b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

14a) Attitude to innovation and quality by individuals - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

14b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

15a) Co-operation with external parties (customers, suppliers, government organisations) in the innovation and quality process - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

15b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

16a) Organisation innovation and quality culture - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

16b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

17a) Recognition and reward for the innovator - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

17b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTIED	( )	( )	( )	( )	( )	( )	( )	

18a) Values and ethics - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

18b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

19a) ISO 9001 standards - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

19b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

20a) Innovation management principles and policies - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

20b) To what extent is the above PRACTICED/USED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

21a) Use of prayer and spiritual activities like reading a Bible or Quran - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

21b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

22a) Good employee relations (participation, satisfaction, empowerment) - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

22b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

23a) Support from other departments - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

23b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

24a) Cross functional innovation teams and quality teams - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

24b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

25a) The action of competitor companies - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

25b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

26a) Influence of government organisations - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

26b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

27a) The current political and economic conditions of the country - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

27b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

28a) The attitude of government to encouraging innovation and quality in organisations - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

28b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

29a) The culture, attitude and skill level of the general labour force in South Africa - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

29b) To what extent is the above PRACTICED/CONSIDERED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

30a) Quality control - To what extent is this IMPORTANT to INNOVATION in quality?

	1	2	3	4	5	6	7	
IMPORTANCE	( )	( )	( )	( )	( )	( )	( )	

30b) To what extent is the above PRACTICED in the organisation?

	1	2	3	4	5	6	7	
PRACTICED	( )	( )	( )	( )	( )	( )	( )	

- SECTION 3: OPEN ENDED QUESTIONS

Instruction: please respond freely to the questions below.

D1) In your opinion, where can innovation arise from in QUALITY?
Answer:

D2) In your opinion, where can innovation arise from in the ORGANISATION?
Answer:

D3) In your opinion, if government was to stimulate innovation and quality in industry, how would they best achieve this?
Answer:

D4) If you would like to add anything with regards to innovation and quality then please include it here. Your input is appreciated
Answer:

END OF QUESTIONNAIRE

9. APPENDIX B: FACTOR TABLES

	ITEM	Component			
		1	2	3	4
1	High quality information	.71552	.477	.183	.204
2	Quality product/service design	.811	.344	.310	-.080
3	Quality process management	.681	.532	.268	.129
4	Top management support	.820	.433	.140	.208
5	Customer relationship	.637	.552	.383	-.107
6	Supplier relationship	.611	.636	.137	.186
7	Workforce management	.479	.625	.465	-.002
8	Statistical measures, control and feedback	.872	.338	.279	-.001
9	Strategic planning for innovation	.869	.381	.210	.115
10	Top management commitment	.701	.498	.083	.264
11	Business environment (dynamic/stable)	.700	.550	.163	.146
12	Education and training	.584	.675	.144	.307
13	Management's attitude	.750	.498	.268	.269
14	Individual's attitudes	.493	.189	.237	.640
15	Open innovation (co-operation with external parties)	.805	.238	.111	.146
16	Organisation innovation and quality culture	.740	.453	.140	.313
17	Recognition and reward	.411	.702	.191	.381
18	Values and ethics	.583	.679	.150	.230
19	ISO 9001 standards	.555	.720	.091	.288
20	Innovation management principles and policies	.618	.661	.048	.285
21	Prayer and spiritual	.000	.205	.576	.554
22	Good employee relations	.433	.747	.202	.298
23	Support from other departments	.780	.481	.268	-.014
24	Cross functional teams	.763	.405	.027	.300
25	The action of competitor companies	.239	.709	.249	.181
26	Influence of government organisations	.177	.020	.893	.125

27	The current political and economic conditions of the country	.335	0.730	0.168	-0.286
28	Attitude of government	0.253	0.285	0.794	0.064
29	The culture, attitude and skill level of the labour force in South Africa	0.458	0.740	0.079	0.055
30	Quality control	0.663	0.654	0.163	.177

Table A1 (above): Rotated component matrix identifying the factors for factor analysis

	Low	Medium	High
Is the level of risk associated with innovation important with regards to encouraging innovation?	5.1	20.5	74.4
How important is implementing innovative ideas with regards to encouraging innovation?	2.6	10.3	87.2
How important are the benefits of innovation with regards to the pursuit of quality?	0.0	7.7	92.3
Is it important to implement both quality and innovation practices together?	0.0	2.6	97.4
Is it important to have innovative individuals in quality to encourage innovation?	0.0	7.9	92.1
How important is using independent groups or teams with regards to encouraging innovation?	7.7	12.8	79.5
Is it important that managers allow innovation and positively influence the level of innovation?	5.1	0.0	94.9
Is it important that the quality department is innovative?	7.7	5.1	87.2
Does pursuing suitable innovation practices throughout the organisation encourage innovation?	0.0	7.9	92.1
Does the level of innovation in the industry encourage and influence new innovations?	10.5	10.5	78.9
Do government policies, reward systems and support structures encourage innovation practices in quality?	30.8	28.2	41.0

Table A2 (above): A table showing the frequency response for Section 2A

	Low	Medium	High
We conduct a formal risk analysis before implementing a new idea that satisfies the organisations quality requirements	10.3	20.5	69.2
Our organisation regularly implements new and uncertain ideas in quality	46.2	17.9	35.9
Our organisation benefits from its quality and innovation practices	2.6	12.8	84.6
Our organisation implements both quality and innovation practices and achieves because of it	7.7	17.9	74.4
I am encouraged to be innovative and ì am supported in it	10.3	5.1	84.6
Independent groups or teams are formed in my work place to brainstorm ideas or creatively solve problems related to quality	25.6	5.1	69.2
Managers regularly initiate innovative ideas and implement them or allow innovative ideas to be initiated and implemented	25.6	7.7	66.7
The quality department that I am in regularly initiates and implements innovative ideas	12.8	12.8	74.4
The employees throughout the organisation that I work for are regularly coming up with creative and innovative ideas that affect quality	23.1	23.1	53.8
The industry that we are in influences the amount of risk that we take with implementing new ideas	15.4	17.9	66.7
Government organisations are present in our industry to help with implementing or stimulating quality and innovation practices	66.7	10.3	23.1

Table A3 (above): A table showing the frequency response for Section 2B

	Yes	No
Have you personally done anything in quality that can be regarded as innovative?	86.5	13.5
With regards to quality, have any independent groups/teams in the organisation done anything that you know of that can be regarded as innovative?	86.5	13.5
Has the Quality Department done anything in quality that can be regarded as innovative?	91.9	8.1
Has the organisation done anything in quality that can be regarded as innovative?	88.9	11.1
Has management done anything in quality that you know of that can be regarded as innovative?	83.3	16.7

Table A4 (above): A table showing the frequency response for the additional questions in Section 2B

	Item	Importance	Practice
1	Receiving information that is of a high quality standard	87.2	76.9
2	Quality product/service design	92.3	76.9
3	Quality process management	87.2	76.9
4	Top management support for ideas and quality initiatives	87.2	74.4
5	Customer relationship	92.3	84.6
6	Supplier relationship	89.7	76.9
7	Workforce management (or impact on quality	94.9	64.1
8	Statistical measures, control and feedback	89.5	71.1
9	Top management strategic planning for innovation and quality	89.7	71.1
10	Top management commitment	89.7	68.4
11	The changing business environment (e.g. a dynamic changing environment or a relatively stable static one	92.3	69.2
12	Education and training in innovation for quality	89.7	79.5

13	Attitudes to innovation and quality by management	87.2	61.5
14	Attitude to innovation and quality by individuals	79.5	69.2
15	Co-operation with external parties (customers, suppliers, government organisations) in the innovation and quality process	87.2	74.4
16	Organisation innovation and quality culture	84.6	69.2
17	Recognition and reward for the innovator	81.6	56.4
18	Values and ethics	92.3	76.9
19	ISO 9001 standards	89.7	81.6
20	Innovation management principles and policies	89.7	69.2
21	Use of prayer and spiritual activities like reading a Bible or Quran	44.7	27.0
22	Good employee relations (participation, satisfaction, empowerment	92.3	78.9
23	Support from other departments	92.3	71.1
24	Cross functional innovation teams and quality teams	86.8	71.1
25	The action of competitor companies	82.1	76.9
26	Influence of government organisations	61.5	51.3
27	The current political and economic conditions of the country	91.9	66.7
28	The attitude of government to encouraging innovation and quality in organisations	69.2	41.0
29	The culture, attitude and skill level of the general labour force in South Africa	84.6	56.4
30	Quality control	89.7	81.6

Table A5 (above): A table showing the percentage frequency response for Section 2C importance and practice

I = importance, P = practice, G = gap	I	P	G
Level of risk	5.51	5.15	-0.36
Implementing Innovation	5.87	3.74	-2.13
Benefits of innovation	6.00	5.79	-0.21
Innovation AND quality practices	6.16	5.51	-0.65
Innovative individuals	6.13	5.59	-0.54
Groups and teams	5.54	4.85	-0.69
manager's influence	6.26	5.10	-1.15
Quality department	6.08	5.38	-0.69
Organisation innovation	5.87	4.46	-1.41
Industry innovation	5.32	5.00	-0.32
Government influence on innovation	4.08	2.92	-1.15

Table A6 (above): A table showing the scores for importance, practice, and the gap difference between them for Sections 2A and 2B

Gap Scores

I = importance, P = practice, G = gap		I	P	G
1	Receiving information that is of a high quality standard	5.9744	5.1282	-0.85
2	Quality product/service design	6.0000	5.2821	-0.72
3	Quality process management	5.8974	5.3590	-0.54
4	Top management support for ideas and quality initiatives	5.8718	5.3590	-0.51
5	Customer relationship	6.3077	5.8205	-0.49
6	Supplier relationship	5.9744	5.2821	-0.69
7	Workforce management (or impact on quality	6.1538	5.1538	-1.00
8	Statistical measures, control and feedback	6.0263	5.2895	-0.74
9	Top management strategic planning for innovation and quality	5.9744	5.2632	-0.71
10	Top management commitment	6.1538	5.3684	-0.79
11	The changing business environment (e.g. a dynamic changing environment or a relatively stable static one	5.8205	5.2308	-0.59

12	Education and training in innovation for quality	6.1538	5.5385	-0.62
13	Attitudes to innovation and quality by management	5.8718	5.0769	-0.79
14	Attitude to innovation and quality by individuals	5.6154	5.0769	-0.54
15	Co-operation with external parties (customers, suppliers, government organisations) in the innovation and quality process	5.7692	5.2821	-0.49
16	Organisation innovation and quality culture	5.9487	5.2308	-0.72
17	Recognition and reward for the innovator	5.7895	4.6410	-1.15
18	Values and ethics	6.2821	5.5641	-0.72
19	ISO 9001 standards	6.2564	5.7632	-0.49
20	Innovation management principles and policies	6.0256	5.2564	-0.77
21	Use of prayer and spiritual activities like reading a Bible or Quran	3.8421	3.0541	-0.79
22	Good employee relations (participation, satisfaction, empowerment	6.2308	5.4474	-0.78
23	Support from other departments	6.1026	5.3684	-0.73
24	Cross functional innovation teams and quality teams	5.8158	5.0263	-0.79
25	The action of competitor companies	5.7949	5.2821	-0.51
26	Influence of government organisations	4.7949	4.0769	-0.72
27	The current political and economic conditions of the country	5.6216	4.8205	-0.80
28	The attitude of government to encouraging innovation and quality in organisations	5.0256	3.9744	-1.05
29	The culture, attitude and skill level of the general labour force in South Africa	6.1538	4.8718	-1.28
30	Quality control	6.2051	5.8684	-0.34

Table A7 (above): A table showing the scores for importance, practice, and the gap difference between them for Section 2C