Assessing the use of foresight as a managerial skill to manage business decisions in an academic institution

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ABSTRACT

In the recent decades there have been tremendous technological and innovative advances that have shaped the business. Technology Laws like Moore's, Gates law, Gilder's Law, Metcalfe's Law and Less's Law shows the rate at which technological development has taken place. This has impacted how society as a whole functions and thus had changed the whole business environment and the rate at which new trend and ideas are adopted. It has become important for organisations to develop dynamic capabilities to be able to adopt in these environments where they could easily become redundant in a very short time.

The aim of this study was to assess the use of foresight as a managerial skill to manage business decisions in academic institutions. For this study the primary focus was on higher academic institutions in South Africa.

These higher academic institutions have been operating in a business environment that is highly competitive considering they focus on delivering quality products and services to the communities they serve. These products and services have to be competitive with the rest of the international market and thus they have to ensure they deliver products and services that are relevant to the latest industry trends and technologies. Foresight as a skill is very useful in the early detection of new trends, technologies and assist in the improving the innovation of these organisations.

Exploratory research found that within these organisations there is a strong representation of Flexist's which are hesitant to adopt new technologies, where they would rather wait till it is tried and tested before adopting the technology. The results also depicted a relationship between the ways these organisations adopted technologies to that of the technology adoption life cycle model. The exact same way new technologies have to cross the chasm in the market was found within the organisations where there were some staff members being early adopter of new technology and the rest pragmatists.

Finally a foresight skill measurement formula had been developed which can be adopted to various industries. It can indicate areas where the organisations need to improve and plot them on an exponential curve showing their rate of effectiveness. The curve also indicates how effective they are at the implementation of foresight.

Recommendation for further research in this field can be aimed at getting a better understanding of the relationship between the biographical information such as qualifications, age and years of experience impact the ability of foresight as a skill.

Key terms: Foresight. Innovation management, Strategic management, Future research.

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LIST OF ABREVIATIONS

CSR- Corporate Social Responsibility

STI – Science, Technology and Innovation

PEEST- Political, Economic, Environment, Social and Technological

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CHAPTER 1:

ORIENTATION AND PROBLEMSTATEMENT

1.1 INTRODUCTION

In the fast changing times and genuine uncertainties in the business environment, strategic foresight has been acknowledged to play a significant role in organisational success and renewal (Sarpong, Maclean & Alexander, 2013:33). Researchers and practitioners agree that foresight, that is, an ability to foresee how the future might unfold, is an important strategic capability and critical for effective long-term planning; however, there is very little systematic research done on this practice (Peter & Jarrat, 2013).

Foresight can be defined as a crucial function that is used to prepare for the future; not only to identify the promising technological pathways, but also to engage relevant stakeholders and create common visions into action (Könnölä *et al.,* 2010:252). Foresight is the ability to plan and think systematically about future scenarios in order to assist decision-making in the present and has been applied extensively by corporations and governments alike in crisis management. To better understand the function of Foresight it is important to understand the context in which it functions. (Constantinides, 2013:1657)

1.2 CONTEXT

In an ever changing environment foresight can be complicated due to the fact that dispersed groups have diverse, non-overlapping pieces of information that affects an organisation's ability to detect, mitigate, and recover from failures (Constantinides, 2013:1657). In this new era of business the foresight processes can also become a pertinent design phase, where the creation of new value networks can be made which are based on the novel combinations of technologies, organisational partnerships and institutional arrangements (Könnölä *et al.,* 2010:252).

Certainly, if technological necessity is the most common argument for foresight, then the strength of overall justifications for the field should only be expected to increase with time. As social complexity continues to intensify as new permutations of heterogeneous post-globalization multi-polarity have taken shape, interfering with the

predictability of even rational stakeholder actions and calling for new ways to both define and encourage ‘‘development’’ (Fidler, 2011:451).

Beyond this, though, human capabilities continue to strengthen in increasingly powerful and unintuitive technologies, including advanced biotechnologies and even systems based on quantum phenomena. Technologies like these could threaten traditional biological and mechanistic foundations of causation which in turn will demand new approaches to consequential reasoning thus illustrating the impact these changes have and the dire need for Foresight (Fidler, 2011:451).

Finally these systemic environmental issues are rapidly coming to the fore and that the combined and compounding effects of all of these trends imply that, based on its own logic, the need for all varieties of foresight are greater than at any point in history. This state of affairs highlights an interesting issue, that if the need for foresight is increasing at an increasing rate, but the actual growth of the field remains anaemic, then, by definition, a growing gap is emerging between the aspirations of the field and its actual contributions. It is clear then that even though there is a need for Foresight, there is still very little done to understand how it works and how it can be developed and implemented in managing business decisions (Fidler, 2011:451).

1.3 CAUSAL FACTORS

To better understand the factors influencing Foresight it is important to understand what strategy is defined as according to the business dictionary (2014), “*A method or plan chosen to bring about a desired future, such as achievement of a goal or solution to a problem*”. Further Gartenstein (2014) explains that Strategic planning is important to an organisation because it provides a sense of direction and outlines measurable goals. These goals aid in setting the path of direction for the business but also needs to be adaptable to the changing business environment. Martin (2014) explains that actually choosing a strategy entails making decisions that explicitly cut off possibilities and options thus causing those decisions to be scary because they can wreck executives’ careers.

A company’s strategy consists of the competitive moves and business approaches that managers are employing to grow the business, attract and please customers, compete successfully, conduct operations, and achieve targeted levels of organisational performance where the strategy focuses on how the company plans to

do this. Most corporations would purport to have a well-defined strategy which they have developed to take their business further; however, strategy is often confused with operational planning where planning is focussed on delivering a more effective outcome for the business as it exists and not about positioning the company for the future. It is clear that it is important to differentiate between strategy and strategic planning and it cannot be underestimated considering the role it plays in the success of the business (Hough *et al.*, 2011:5; Morgan, 2013).

Strategy can be better understood when seen that it consists of its own heart and soul which are the actions and moves which managers take in the marketplace to improve the company's financial performance, strengthen its long-term competitive position, and gain competitive advantage over competitors. A company has the potential to earn significantly higher profits when it enjoys a competitive advantage as opposed to when it is hamstrung by competitive disadvantages, but furthermore a temporary competitive edge will not last thus the aim for having a sustainable competitive advantage (Hough *et al.,* 2011:6).

There are four commonly used and dependable strategic approaches to set a company apart from competition, building a strong customer loyalty, and winning a sustainable competitive advantage (Hough *et al.,* 2011:6) which are the following:

- Striving to be an industry low cost provider which aims at cost-based competitive advantage over competition.
- Outcompeting competition in terms of differentiation features such as higher quality, wider product selection, added performance, value added services, more attractive styling, technological superiority, or unusually good value for money.
- Focusing on narrow niche markets and winning a competitive edge by doing a better job than the competition of serving the special needs and tastes of buyers comprising the niche.
- Developing expertise and resource strengths that allow the company to have competitive capabilities that rivals cannot easily imitate or trump with their own capabilities.

A different perspective on building a competitive advantage is where the companies analyse the prospects that influence social responsibility, using the same framework

guiding their business choices, they would discover that Corporate Social Responsibility (hereafter referred to as CSR) can be a source of opportunity, innovation and competitive advantage rather than a cost, constraint or just a charitable deed (Porter & Kramer, 2006). The European Commission (2013) defines CSR as "The responsibility of enterprises for their impact on society". The European Commission (2013) further explains that to fully meet their social responsibility, enterprises "should have in place a process to integrate social, environmental, ethical human rights and consumer concerns into their business operations and core strategy in close collaboration with their stakeholders".

The triple bottom line also refers to the CSR of a company and is broken down into three separate factors known as People, Planet and Profit (Measures, 2014). As seen from above it has a direct impact on the competitive advantage of the company. The first of these factors, People, as explained by Measures (2014) revolves around the aspects of ensuring that the company's operations benefit the company employees as well as the community in which it conducts business. The focus is not only concerned with employee compensation but also with creating safe and pleasant working environments for their employees.

The second factor, Planet, is described as the effort companies do to avoid any activities that harm the environment and look for ways to reduce any negative impact their operations may have on the ecosystem (Measures, 2014). The control of energy usage and to help reduce environmental impact along with the use of other sustainable developments helps increase a company's profitability while contributing to the health of our planet (Measures, 2014).

The final factor is Profit, where profitability had been the main focus for companies in the past when it came to the bottom line, but business today has expanded to thinking differently in this regard (Measures, 2014). Furthermore, Measures (2014) explains that in today's interconnected world, thinking about profits as if they were unrelated to the economic and social impacts of what you do to get them are short-sighted and counterproductive". In considering future trends it is clear that there will be a change how the TBL impacts a business and it will have to adapt to new environmental changes.

In evaluating future trends Kjaer (2013) explains that it is oftentimes the case that when looking into technology, which focuses on obvious factors such as speed, size and cost, people are forgotten as an integral factor that aids to shaping the future and sociology of technology. The current Triple Bottom Line which consist of People, Planet and Profit is adapted by Kjaer (2013) to have four focus fields for 2020 predictions on how the business environment will look. Kjaer (2013) uses the current Triple Bottom Line as basis but adds Purpose to make the four-P Bottom Line.

Perhaps another factor in foresight is vision which has been among the most coveted and discussed leadership qualities of the past two decades and this much sought-after trait allows leaders to guide their organisations by creating meaning and purpose. When applied strategically, this translates into practical plans and meaningful work. This critical skill often comes through the use of Foresight which does not mean guessing about the future or forecasting current trends but means identifying relevant opportunities that are emerging and strategizing how to make the most of them today (Emelo, 2011).

To enable the vision of the company Hough *et al.* (2011:23) mention how crafting and executing strategy are the heart and soul of managing a business enterprise with the ultimate aim to create value and become a sustainable high performance business. The process involved for managerial staff involves the following five interrelated and integrated phases: developing a strategic vision, setting objectives, crafting a strategy, implementing and executing the chosen strategy efficiently and effectively, and finally evaluating performance and initiating corrective adjustments (Hough, 2011:23). It can clearly be seen that Foresight is then influenced by these strategic building blocks, which if not used correctly may leave the company vulnerable and exposed.

To better understand the changing environment, Cagnin, Havas and Saritas (2013:380) explain that when analysing the potential of future-oriented technology, there are added analyses to assist societies, decision-makers and businesses when approaching fundamental, disruptive transformations, in general, and grand societal challenges, and in particular it is important to understand the very nature of change. Change could be already occurring or is likely to occur with or without conscious human actions thus both would need to be identified and understood in order to allow

one to be better prepared for the future and/or shape it in order to realise a favourable future state (Cagnin *et al.,* 2013:380).

These transformations can occur as a result of disruptive events, on-going processes, or transformation by design where the factor of change and sudden disruptive transformations are driven by profound technological changes, emergence of new business models, major economic restructuring, environmental disruptions, or shifts in social norms, values and lifestyles.

Considering the above-mentioned dynamics involved, it is likely to be both a systematic and a strategic problem according to (Fidler, 2011:451) influencing Foresight, which could better be understood from Moore's Law. Moore's law, as described by Pinto (2002), is seen as being formulated by Gordon Moore of Intel in the early 70s, where the processing power of a microchip doubles every 18 months. Corollary, computers become faster and the price of a given level of computing power halves every 18 months.

Pinto (2002) further explains that the next era of device connectivity would allow for companies to communicate uninterrupted with their devices and thus adding value to the customer. Stevens (2013) explains that even today one can buy a computer and expect that in 3-6 years it will be relatively "low end" for the market. Plourde (2010) describes how, through Moore's Law the very advanced technologies are becoming very common as can be seen in Figure 1.1 showing the effect of the Long Tail of Academic technologies.

Perhaps the final factor driving the need for Foresight is seen in Anderson's (2006) explanation that describes how whilst search and distribution technologies improve, and costs continue to decrease, that in future markets top sellers will constitute a smaller share of total sales and the number of different products will increase dramatically thus being called The Long Tail of Technology. Figure 1.1 shows how, for example, academic technologies, are now being outsourced due to the high cost of supporting them internally.

1.4 IMPORTANCE OF THE STUDY

Considering that the impact Foresight makes on a business, it compels us further to better understand what the relationship between these causal factors and Foresight

looks like. As Fidler (2011:451) explains, that, this is exactly the kind of situation where a re-examination of the theoretical underpinnings of a discipline might prove most useful. Cross disciplinary perspectives are increasingly common in academia and, indeed, have brought new light to a number of disciplines.

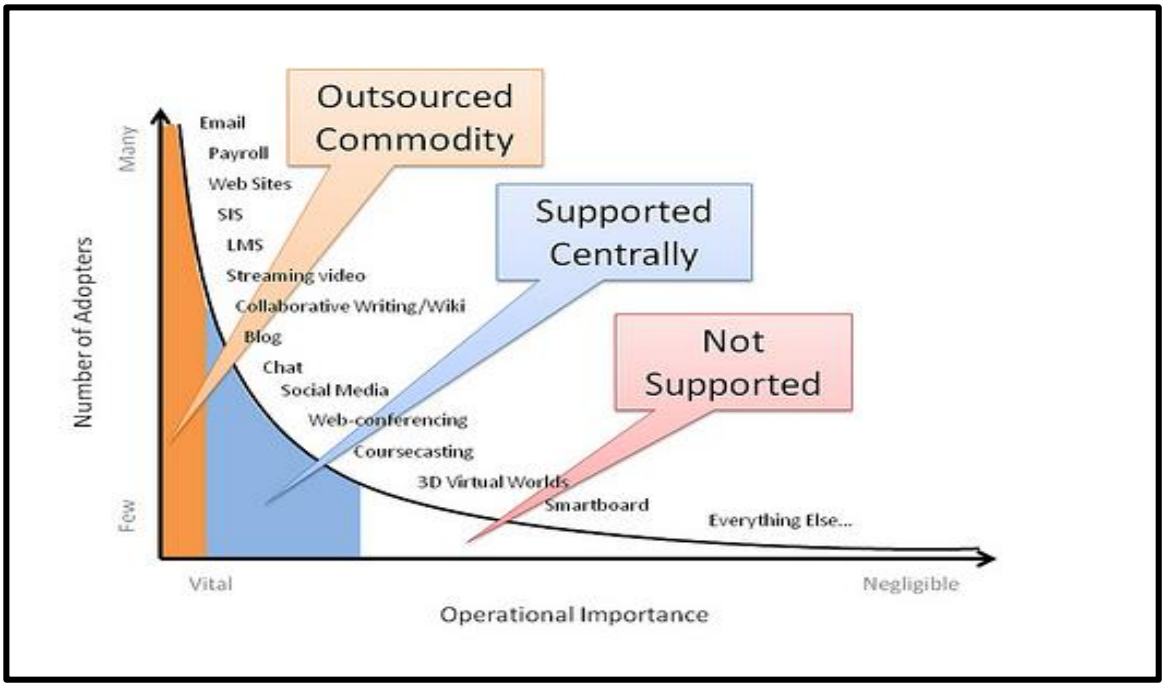


Figure 1.1: The Long Tail of Academic technologies. Source: Plourde (2010).

In the realm of future-orientated analysis that encompasses foresight, forecasting, and technology assessment approaches, foresight is perhaps the most comprehensive one suitable for providing policy support to address major societal challenges (Könnölä, Scapolo, Desruelle & Mu, 2011:252). According to Könnölä *et al.* (2011:252) the locus of foresight activities has tended to shift from positivist and rationalist technology-focused approached towards the recognition of broader concerns that encompass the entire innovation system, including societal perspectives.

The relationships among these connected disciplines are interesting, where each involves the study of general human behaviour from a unique perspective (Fidler 2011:451). Kjaer (2013) explains that, to observe trends, it is crucial to understand that these are interlinked and connect to socioeconomic and cultural drivers influencing tomorrow's business success stories. With this confluence of subject matter, it is hardly surprising that, in dialogue, these disciplines have much to teach one another (Fidler, 2011:451). In light of the common argument that self-justifications

among foresight and futures, researchers predominantly rely on appeals to utility in decision-making contexts and that Futures Studies and Strategic Management could well be seen to be in a similarly symbiotic situation, where the mutuality is a potential sign of latent opportunity (Fidler, 2011:451).

1.5 PROBLEM STATEMENT

The above has indicated that the importance and need for Foresight exist, but the complexity still needs to be addressed. According to Fidler (2011:541), Futures Studies has long argued its own applicability to decision-making contexts, but any corollary relevance that Strategic Management might have for Foresight has been much less well recognized. Yet both fields share a common tension between theory and application and a broad area of study (Fidler, 2011:541). Indeed, if Foresight is concerned with anaemic growth rates, it could be that the language of Strategic Management is generally more widely understood among circles of high-level decision-makers (Fidler, 2011:541). As seen before the issue here are the relations between the two fields and deeper understanding needs to be gained in the dynamics of this relationship.

One perspective of strategic management has been based on a full description of the general backward-orientation of organisation that is the heart of Foresight and can be seen as the means where organisations collect experience into an increasingly effective system. During periods of discontinuous change, it gives rise to situations where past learning is not just rendered out of date, but irrelevant or even counterproductive (Fidler, 2011:541; Peter *et al.,* 2013:35).

While changes bring forth these “systems shocks” it can be seen that these are the instances in which traditional management information may be least effective and correspondingly where Foresight may be of greatest value. Thus, even completely foreseeable changes are likely to catch organisations generally off guard and discontinuous change is likely to render managerial structures completely ineffective until expensive trial and error results in a new base of experience from which to operate (Fidler, 2011:451-452; Peter *et al.*, 2013:35).

To aid in the prevention of having managerial structures that are ineffective Könnölä *et al.* (2011:253) contend that in many cases a more structured approach to foresight activities which address societal challenges, greatly benefit the very design of those

foresight activities by helping to identify management's expectations concerning the foresight process itself, as well as the final outcomes. Further the systematic understanding of the innovation processes has challenged conventional technology-driven forecasting practices and called for new participatory Foresight approaches that address also the consideration of diverse perspectives, formation of shared knowledge and examination of alternative futures (Könnölä *et al.,* 2011:253).

Foresight activities are considered to be crucial functions in order to prepare for the future, not only to identify the promising technological pathways but also to engage relevant stakeholders and create common vision and action plans, also understanding that foresight processes can be seen as the pertinent creation of new value networks (Könnölä *et al.,* 2011:252).

There are substantial rewards for integrating foresight methods into the planning process to envisage alternative futures, provided the risks of pioneering aligned with those futures are recognised and managed (Peter *et al.,* 2013). Sarpong *et al.* (2013:39) explain that there is potential for further research conducted into how foresight is more dynamic organisational practices where attention to the underlying processes through which managers can improve their actions to include strategic foresight within their organisations.

1.6 RESEARCH OBJECTIVES

In the field of foresight there is a need for research on how foresight impacts organisations and their operations. The study aims to build a framework that will provide better understanding into how foresight works and how it can be acquired as a skill to improve a company. The application of the framework aims to be universal and assist managers to make better decisions for their organisations to help them gain a better competitive advantage.

It is clear from the above literature that there is an ever changing technological society, business environment, growing international network thus causing the need for a business that aims to succeed, it must be able to stay in tune with these trends or to set these trends. It is clear that there is a need for research on *using foresight as a managerial skill for managing business decisions*.

1.6.1 Primary objective

The primary objective of this study aims to assess the use of foresight as a managerial skill to manage business decisions within selected higher academic institutions. Its aims to develop a framework from which managers can make better decisions to develop their higher academic institutions to better suit the needs of the changing environment.

1.6.2 Secondary objectives

The primary question focuses on how foresight is used as a managerial skill for managing business decisions. The secondary questions aim to better understand the factors influencing foresight as a skill. The secondary objectives are:

1. Determine the factors on which foresight is dependent.
2. Identify the skills that have an impact on the development of foresight.
3. Understand current methods currently used to implement foresight in the business environment.
4. Determine which skills are critical to the successful use of foresight in an organisation.
5. Understand the relationship that technology has on the use of foresight as a skill.

1.6.3 Research Questions

These are the key questions that will be used to guide the study and the gathering of information ranging for Journal articles, Books and current internet based related articles that can contribute to the study:

1. What are the factors upon which foresight is dependent?
2. Which skills influence the development of foresight?
3. How are current Foresight methods used and implemented in the modern business environment?
4. Which critical skills need to be acquired in order to use foresight successfully?
5. How does technology impact foresight as a skill?

1.7 RESEARCH METHODOLOGY

The study will use a mixed method approach. The main instrument will be constructed in a questionnaire that assesses the use of foresight as a managerial skill in higher academic institutions. The questionnaire will ask questions where participants would have to provide answers that could not be measured on a Likert scale. Secondly, a quantitative approach will be used towards the research objective as Creswell (2009:4) explains that it is a means for testing objective theories by examining the relationship between variables.

These variables can be measured by using instruments that makes use of analysing numbered data statistically (Creswell 2009:4). The sample will be selected on a stratified basis, consisting of managers, male and female, who have to make everyday decisions regarding their business on a daily basis ranging from small businesses to large businesses.

The instrument designed for this study made use of four point Likert scales to collect data from the sample. The four point scale is used to prevent indecisiveness from respondents. The instrument will be piloted to ensure that the questions asked are clear and understandable to gain the best quality data from respondents. In this study the Independent variable will be Foresight and the dependent variables will be based on the number of various factors influencing Foresight.

1.7.1 Literature and theoretical review

The basis of this study is grounded in recent literature from various academic sources describing the field of Foresight. Due to the broad bases of academic fields in which Foresight exists there is an abundant supply of scholarly articles to use for researching variables in the study.

1.7.2 Empirical research

Using the literature and theoretical review as basis along with the information gathered from interviews, a questionnaire was developed, used to collect data and statistically analysed to examine the relationships between the variables, used to build a framework to manage business decisions.

1.7.3 Limitations

The limitations of this study can be encountered by firstly the interpretation and understanding of Foresight as a skill. Participants may never have heard of the term and may struggle to place it in context. Another limitation is the sending and receiving of questionnaires from participants in the designated timeframe.

1.8. LAYOUT OF THE STUDY

The study will be divided into segments to logically analyse the methodology and basis on which foresight is based. This will help understand how it is implemented and used in the industry. The second Chapter will focus on the existing literature on foresight where it explains how foresight came into existence, the management areas it has impacted and the on-going research that has its main influence on the purpose of foresight.

The third chapter will be the Empirical research section where the information gathered in chapter two aided in the design of questionnaires to conduct how well foresight is used and how the application thereof is within the participating firms. Chapter four will be the discussion of results and the interpretation of the feedback from statistical analysis.

Chapter five will focus on the conclusions and the recommendation that can be made to help aid future organisations on how to use foresight as valuable tool to make decisions that will help them gain competitive advantage. Chapter six will be the Summary and give a set of suggestions on where there may be a need for further research in the field of foresight and the application to educational institutions.

1.9 CONCLUSION

It is clear that there is a definite need for organisations to be able to adapt to their environments more rapidly or risk the chance of losing their competitive advantage. Even more organisations may lose the source of their income by a sunned decrease in their market share and this leading to serious implications on the well-being of the organisation. With the rate at which technology is changing the way education and social interaction is taking place between the environment and organisations it is

imperative to have a better understanding how these relationships are influenced by future decisions.

The aim then of this research study would be to assess current models and to determine predominant factors that affect foresight. This of course would imply that the various factors playing a role in the development of foresight as skill needs to be understood along with the methods currently being implanted and their success being applied in organisations. The focus would be on determining which of these methods are most applicable and can aid higher academic institutions to be successful in their environments.

1.10 CHAPTER SUMMARY

The chapter was used to explain the context and causal factors that are related to foresight as a skill and the implementation thereof. The importance of the study had been discussed and the problem statement had been clearly stated. Research objectives have been clarified and secondary objectives identified.

The proposed research methodology was discussed along with the literature review and the theoretical overview. The method for conducting empirical research was discussed along with limitations of the study.

The Chapters for the study will be as follows:

Chapter 1: Orientation and Problem statement

Chapter 2: Literature review on Foresight

Chapter 3: Research Methodology and Design

Chapter 4: Results and Conclusions

CHAPTER 2

LITERATURE REVIEW ON FORESIGHT

2.1 INTRODUCTION

Considering the complexity and various fields that are integrated into the application of foresight it is important to grasp the full meaning of what foresight is and how it is applied in the business environment. Along with the understanding of its application, the development of foresight and process needs to be examined to determine how to use this skill as an effective tool. This application can be applied to make better future orientated decisions for higher academic institutions.

2.2 DEVELOPMENT AND HISTORY OF FORESIGHT

For organisations to have long-term success they need to be frequently adapting to their environment that leads to a new perspective which portrays organisations as being dynamic. Companies need both the ability to manage continuous adaption to incremental change to stay ahead of the known competitors and the ability to detect discontinuities early to manage radical changes through corporate strategy, innovation management, and their internal structures (Rohrbeck, 2010:1). This ability according to Rohrbeck (2010:1) is called *corporate foresight*.

The complexity of the social, technological, political and economic phenomena makes their anticipation a necessity, thus causing the need for these determinants functioning to be indispensable for choosing a working strategy that empowers the company to be competitive (Magruk, 2011:700). The term Foresight had become used more often since 1980s and since then numerous definitions existed defining various elements of Foresight (Amanatidou, 2014).

The major terminology shift had happened during the 1980s where the terms in publications like “technology forecasting” and “technological forecasting” were often used, but the term “technology foresight” really came into use during that time (Miles, 2010:1449).

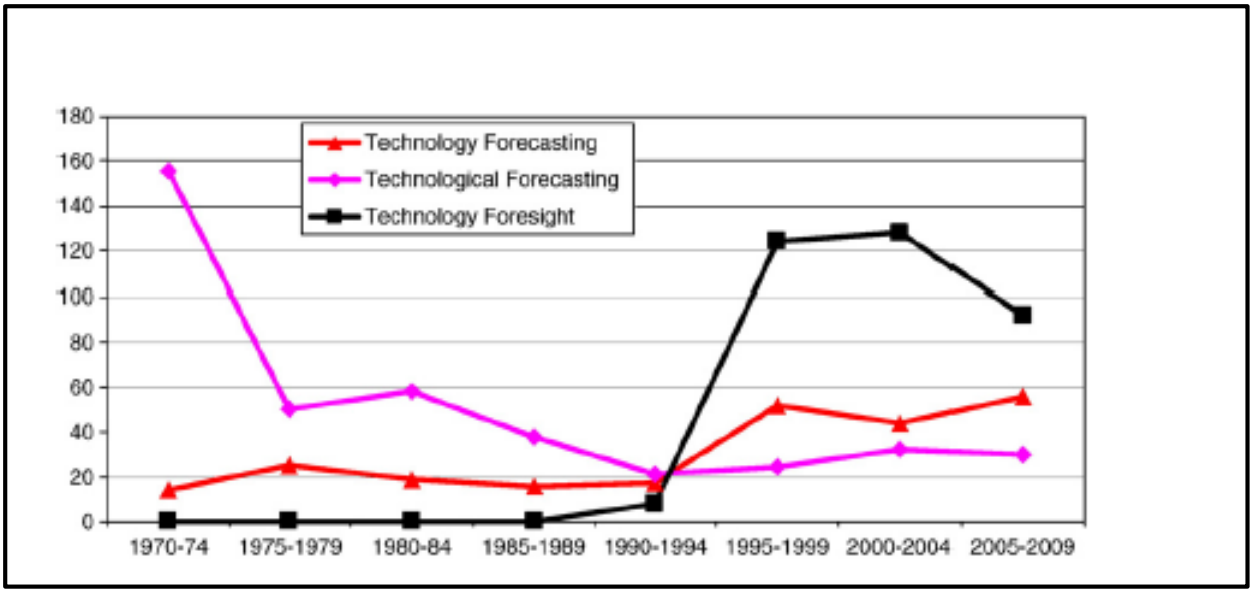


Figure 2.1: Publications featuring key terms in their titles. Source: Miles (2010:1449).

Coates' elaboration of the term foresight according to Miles (2010:1451) in 1985 is as follows:

> *"Foresight is a process by which one comes to a fuller understanding of the forces shaping the long-term future which should be taken into account in policy formulation, planning and decision-making … Foresight includes qualitative and quantitative means for monitoring clues and indicators of evolving trends and developments and is best and most useful when directly linked to the analysis of policy implications. Foresight prepares us to meet the needs and opportunities of the future. Foresight in government cannot define policy, but it can help condition policies to be more appropriate, more flexible, and more robust in their implementation, as times and circumstances change… It is not planning – merely a step in planning".*

Coates in 1985 placed a great deal of emphasis on scanning and forecasting but not specifically orientated to science and technology, where Slaughter again in 1995 relates foresight to decision-making and organisations (Amanatidou, 2014:1). During the 1980s Canada's Science Council explicitly linked technology and foresight which focused mainly on threats, opportunities, and national scientific and engineering capabilities, associated with innovation in generic technologies and strategic topics (Miles, 2010:1451).

Various accounts in history describing forecasting activities dating back to the first application of foresight programmes which in essence reflected the actual aims of the specific programmes (Georgiou, 2008; Magruk, 2011:701). Various attempts to define foresight to identify its fundamentals have shown how certain elements are repeated (Magruk, 2011:701). Magruk (2011:701) defined Foresight as the process involved in systematically attempting to look into the long-term future of science, technology, economy and society with the aim of identifying areas strategic research and the emerging generic technologies likely to yield the greatest economic and social benefits.

Thus these elements defining foresight are being seen as the action-orientated instrument for policy-making facilitating structured anticipation, considering alternative futures, requiring creative thinking and multi-disciplinary perspectives, enabling collective learning; proactive path-breaking, interactive and participatory; enabling mediation and alignment, forging new social networks, guiding strategic vision, creating and committing actors to shared vision, and supporting deliberative democracy (Magruk, 2011:700).

The goal of this research is to develop a framework from which experienced or inexperienced managers or entrepreneurs can base business decisions to start their business. To understand the skill set required for this framework it is important to analyse various modern foresight models and fundamentals, to establish the bases of each and then to derive the skills that those functions of managerial positions or entrepreneurs.

2.3. MODERN FORESIGHT MODELS AND FUNDAMENTALS

2.3.1 Factors influencing Foresight

Three fundamental principles of foresight as a process explained from Stout in 1995, are that firstly foresight is not foreseeing the future but creating it. The second fundamental is that neither a single man, nor a single company is able to create the future alone and the third is that new knowledge can benefit many; knowledge kept secret is worthless knowledge (Magruk, 2011:700). Furthermore, it is essential to understand that each factor will have to be properly selected for their function in their desired field of application. In Table 2.1 a list of the categories and factors influencing technology foresight research process can be seen.

Table 2.1: Factors influencing the technology foresight research process.

Category	Factors
Institutions realizing foresight	public institutions; government; the academies of sciences; industrial associations; firms
Range of area studied	individual technology; individual discipline; wide fields; whole areas of science and technique
Aims, tasks, the functions of foresight	Determination economic priorities; building social consensus over some issues; delimitation strategic economic directions.
Levels	supranational; subnational; national; regional and local level; business
Meaning	foresight as a product - foresight as a process; formal – informal
Foresight as a product - foresight as a process; formal - informal	professional analytical model; model of social changes
Aspects	technological; strategic; social; cultural; political; economic; scientific; consumer; and more.
Kind of possessed data	quantitative; qualitative; in digital form; in printed form
Data source	literature; experts; own research, universities; press; medias; scientific publications
Kind of stakeholders	scientists; businessman; politicians; society
Work environment	scientific-business; virtual-real
Time	horizon; project period
Objectives	policy development; networking, shared visions, public discussion, future thinking
Budget of project	high; low
Access to the data	quantitative - qualitative; low – wide
Legitimacy of a combination of methods	low - medium - high - very high

Source: Magruk (2011:701).

If these factors are not taken into account when using foresight, it becomes as process that which is non-systematic and incoherent, and is based solely on intuition and

sometimes the inexperience and irresponsibility of practitioners and organisers (Magruk, 2011:701). Furthermore, there are three major characteristics governing Foresight which are grouped into three major building blocks. The first block is building knowledge where it is leading to development of strategic vision and anticipatory intelligence considering alternative futures based on a multidisciplinary base and through evidence based approaches, interactive and participatory methods of analysis and collective interactions enhancing collective learning (Amanatidou, 2013:1).

The second building block is building networks. This is a process of co-production of communities of stakeholders and as an instrument of transaction, dialogue, negotiation, cooperation and alignment among them. The third building block is the building of participation and action. Bringing more stakeholders and points of view into the decision-making processes, with an orientation to inform present-day decisions, coordinate agents, policies, shape behaviours and routines in view of taking concrete actions towards the realisation of a jointly defined future (Amanatidou, 2013:1).

To successfully use Foresight as a method of getting modern societies more participatory and knowledge-driven, three features have been identified that had the greatest impact. The first factor is that of “Knowledge creation, absorption and diffusion” where this entails that through these, knowledge plays a dominant role and focuses on the provision of knowledge to guide policy direction. The second factor is that of social capital and networking which aids in the support for innovation- based growth. The third factor is the alignment of actors interests, their active participation in dealing with uncertainty, the development of informal publics and, through all these, to the evolution of strategies to cope with or escape from negative consequences of a “risk society” (Amanatidou, 2013:3).

Another perspective on Foresight is that where corporate foresight is divided into two areas which consist of organisational and performance areas. The organisational area which refers to the location and size (number of people involved, dimension, resources, budget, and more) mechanisms (control systems, procedures, and more) of Foresight activities that take place within a company. From literature on organisations (Jones, 2007; Mintzberg, 1979) it can be conceived that the general internal organisation consists of four basic elements, namely: structure, coordination, decision-making processes and control systems (Battistella, 2013).

Structure is divided into two subdivisions, organisational unit/function definition and organisational unit/function dimensions. Definition refers to the basis through which different positions are grouped on the organisation units and dimensions are defined as the number of positions grouped in the same unit. Organisational unit/function definition examples are the complexity of articulation in terms of budget, positions, missions, functions, and units connected, adaption to the general structure of the organisation. The organisational unit/function dimensions subdivision is explained by the number of people, number of units connected, or the standardisation in the organisation (Battistella, 2013:3).

The second element, coordination, is subdivided into specialisation and training. Specialisation refers to subdivisions of labour with examples such as the typology of jobs and numbers, institutionalisation of foresight, specific skills of foresighters, specific methods used and more. Training is the standardisation of knowledge through programmes of education. Examples of training relates to competence and background, and training of the personnel for foresight in the organisation (Battistella, 2013:3).

From the above literature it can be seen that all of the above aspects relate back to three main fields from which foresight has evolved. Figure 2.2 shows how the following areas to be discussed have an impact on the company and its ability to adapt to the future. All of these can be subdivided into one of the following sub groups on which research has been conducted (Rohrbeck, 2011:12):

- The strategic management perspective.
  This field of research included the focuses on ambidexterity, environmental scanning and decision-making.
- The Innovation management perspective.
  (Findings had a significant contribution to the research streams on radical innovations and technological disruptions.)
- The Future research perspective.

  This aspect can be subdivided into two sections where the one focuses on studying public foresight activities for national and supranational organisations and then there is the research stream dealing with corporate foresight practises.

Figure 2.2: Corporate foresight in the modern organisation. Source: Rohrbeck (2011:12)

Figure 2.3 adopted from Rohrbeck (2011:13) shows the development of Foresight research and the contribution of these three research fields from various authors who have focussed on these topics. As can be seen from these fields all interconnect and as seen in Figure 2.2 they all have impacts on Foresight within an organisation.

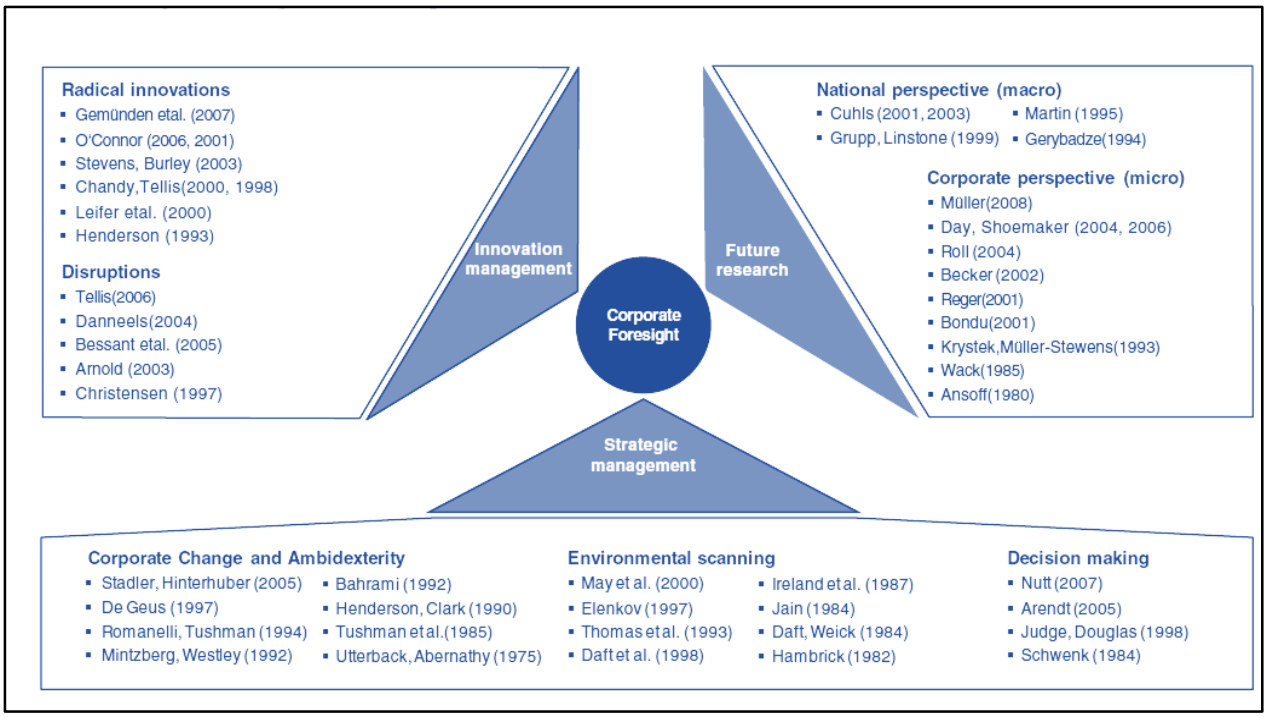


Figure 2.3. Research framework and contribution to corporate foresight. Source: Rohrbeck (2011:13).

There is a clear focus on Strategic management, Innovation management and Futures research within the field of foresight. These concepts will be discussed in depth in literature to follow.

2.3.2 Foresight Process

The current business environment has become increasingly complex and the pace of innovation, futures thinking, and foresight have become crucial tools where organisations are engaging in strategic foresight to maintain sufficient flexibility for future developments. The velocity and dynamism of the environment go along with the torrent of data which is generated by society and technological processes. This causes decision-makers and individuals in general unable to process all of the information hence leaving a need for supportive tools which rely on information and communication technology (Keller, Markmann & Von der Gracht, 2014:81).

Foresight processes are already supported by a large diversity of software applications which includes trend databases, analytical software for trend extrapolation or scenario software packages. Some of these software packages include Data Applied, DevInfo, RapidMiner, PAW and Root. Foresight is defined as a systematic, participatory,

future-intelligence-gathering, and medium to long-term vision building process, aimed at enabling everyday decisions and mobilisation joint action. These should ultimately help the adaptation to future developments that would reflect in decision-making with software serving as a facet of forward-looking decision support and can be referred to as an information and communication technology tool (Keller & Von der Gracht, 2014:82; Predictive Analytics Today, 2013).

From Figure 2.4 there are six steps in the foresight process which constitute of the following:

- Preparation
- Identification Scanning
- Data Collection, foresighting
- Filtering, Analysis and Interpretation
- Decision-making
- Implementation.

These will be further discussed in more detail in literature to follow.

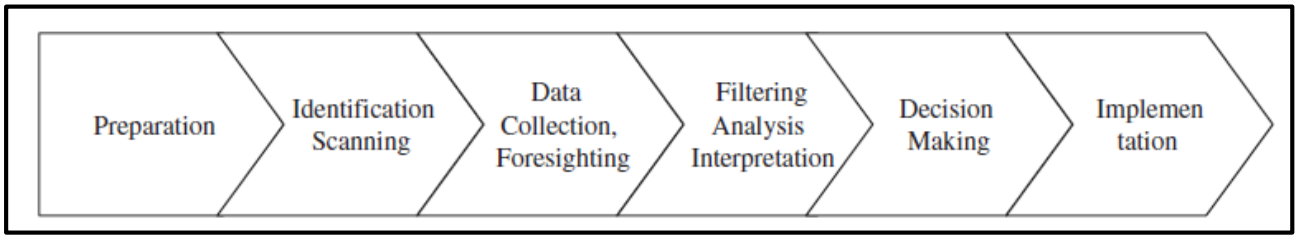


Figure 2.4: Phases of Foresight process. Source: Keller *et al.* (2014:82)

2.3.3 Foresight Styles

Foresight Styles Assessment has found that there is a range and qualities of foresight competencies and proposes six styles with four specific areas affecting these styles and how they utilize foresight when confronted with external change. The four areas identified are temporal orientation, holistic or dual purpose thinking, structural orientation and activity orientation (Dian, 2009:59).

The first aspect raises two issues that relates to an individual's response to change which are temporal orientation (past-present-future) and action orientation. Value orientations are seen as complex but definitely patterned principles resulting from transactional interplay of three analytical distinguishable elements of the evaluative

process, the cognitive, affective and directive elements. The six styles identified from the temporal orientation are futurist, activist, opportunist, flexist (leading group), flexist (later group), equilibrist and reactionist (Dian, 2009:63).

The second area relates to holistic thinking which focuses on seeing the larger picture with all its messy detail, to rational analysis and discussion. It is relevant to consider the effect and strong influence that one or another world view may have on the style in which the individual reacts to change. The third area focuses on how man's natural mode of self-expression is found in the activity they are doing. The being, becoming and doing continuum influences how each style individualise themselves (Dian, 2009:62).

The final area is based upon the individual's need to which has varying degrees of personal need for structure that allows them to make sense of the world around them, form and maintain a clear perception of their own lives as well as within the organisation. Within the terms of foresight and the ability to creatively illustrate possible future scenarios and visions, a need for structure negatively affects our ability to think long range and plan while a greater ability to handle abstraction enhances it (Dian, 2009:67).

With the four areas influencing the foresight styles it is necessary to understand what each are. Here are the six foresight styles according to Dian (2009:68):

- **Futurist**

  This style has two sides. The first side distinguishes between trends and fads due to their knowledge of history along with social patterns and their focus is more on thinking about 5 to 20 years or more. They understand that trends have both a positive and negative character but are neutral observers of what is happening in the environment around them.

  The second side focuses on putting forth messages that communities, politicians and companies need to hear, with the content informing them of possible consequences of behaviour and what might be expected in the future. They always try to look for perspective, trying to see the whole picture.

- **Activist**

  They focus on creating measures that ensure the best future is realised and gain insight from futurists and spread them. They are motivated by a strong commitment to what they do and determine a course of action that they are committed to whilst expecting to be equally enthusiastic. They introduce new ideas and innovation into the system or fight the implementation of a new system.

- **Opportunist**

  They are driven by surviving the present and try to change the future by assuring the present is as good as possible where they can be found focusing on quick changing fads and short-term goals. The positive opportunists are good at fund raising while they may lose focus on the whole picture whilst they are focused on raising money.

- **Flexist**

  These individuals get more things done specifically tasks revolving around administrative tasks like planning and organising. They are grounded in the present but are interested in new innovations that can improve survival capacity where the innovations often come from Futurists and Activists. Flexists, who are integrators of new ideas help gaining the masses to reach the critical number necessary for change. They have the power to implement change or deny it and are driven by survival.

  There are two types of Flexists, leading and later. Leading Flexists are more likely to become interested in ideas put forward and adopt the new concept, behaviour or innovation. Later Flexists will adopt the new idea only after it has been tested by others and source their information from experts, colleagues, trusted friends and family members.

- **Equilibrist**

  They see survival as a matter of staying in balance where the need is not often understood that is grounded in the system, but change is an unavoidable characteristic of the system. They strive for balance that never occurs within the system. Systems that stay in balance would mean they are in homeostasis and there would be no change and thus it is seen as a disruption.

They understand that there are problems but often provide ways to avoid the problems instead of solving them and leads to negative behaviours like keeping quiet, putting up with things, small theft and more They are positive in keeping an organisation running but negative in the sense that they do not understand the gains change could bring.

- **Reactionist**

  These individuals play an interesting part in the ensuring of survival of an organisation since they are the group that withhold the change and future development. It is bad since they have trouble comprehending the reason for change and that planned benefits are worthwhile. The bad is when they find the unknown more as a survival threat than the known even if the known is not good. The main function of these individuals is to keep the Futurist and sometimes the Activist from getting out of hand considering that change for sake of change is not always good. They focus on the past ensuring the good and secure is what is still working.

Considering these foresight styles within an organisation it is imperative to understand the value of each and how they impact the way the organisation is managed in terms of strategic intent and innovation.

2.4 STRATEGIC MANAGEMENT AND FORESIGHT

"Strategy means making clear-cut choices about how to compete."

Jack Welch

Former CEO, General Electric

The concept of uncertainty has been central in the literature on strategy and organisations where early concepts go back to principles that entail arguments that state that business environments are inherently unstable. The instability creates uncertainty for managers that rationally bounded considering the difficulty there is with collecting, processing and comprehending information on external changes. More specifically the uncertainty arises when managers are not confident that they understand the major events or changes in their industry and cannot make accurate predictions for the firm (Vecchiato, 2012:437).

Managers from all companies often face difficult questions regarding the broad strategic and central questions in evaluating their company's business prospects. These questions range from:

- What are the present conditions of the company?
- Where does the company have to go from its present situation?
- How should the company get there?
- How should strategies be aligned to gain sustainable advantage?
- Is there a need for strategic alliances or is single sourcing the way to go?

These questions focus on understanding and evaluating the industry conditions and competitive pressures, the company's present performance and market share, resources and capabilities and finally the company's weaknesses (Hough *et al.,* 2011:4).

To support this, Ansoff (1980) has presented an overview of the evolution on how strategic management developed and had in the process managed to identify five critical phases of the process. The research had shown that these five evolutionary phases have a correspondence between the dominant assumptions, purpose of the management system and the configuration of the system. Another assumption from Ansoff (1980) would be that strategic management systems would move to becoming more real-time which correlates with the advancement that has taken place in the age where Moore's law explains that data doubles every eighteen months. Added to this is Less's law which explains that the cost of storage is falling by half every twelve months, while the capacity doubles (Quon, 2004).

Table 2.2 shows the evolution of strategic management from Ansoff's (1980:131-133) research and shows that here would be an indefinite need for environmental scanning to help recognise the external opportunities and threats that influence direct managerial activities. There is also the prediction made that companies will move toward. A fundamental finding is the use of weak signals to identify early detection in the environment.

Furthermore, there are two theoretical frameworks on strategic management of environmental uncertainty. The one school which focuses on the planning aspect argues that as uncertainty increases, organisations that work more diligently to predict

changes within their environment accurately will outperform their competitors. This approach thus places the emphasis on the importance of systematic analysis and integrative planning, discipline in scanning of trends, the generation of alternatives and forecasts, rational evaluation of information and the integration into its firms existing operations (Vecchiato, 2012:437).

The other school prescribes avoiding prediction and rather focussing on responding to changes as they emerge thus emphasizing the continuous experimentation and fast adaption to changing environments. The goal is for firms to learn what to do next by minimizing the use of predictive rationality but rather by experimenting instead to be able to move quickly to capture emerging opportunities. It places the focus on a purely adaptive approach which avoids defining future changes and events with the goal to position the firm to be able to make timely responses to actual events and changes (Vecchiato, 2012:437).

From both the planning and adaptive perspectives it could be assumed that the key elements of the business environment are exogenous to the organisations' own efforts which leads to the understanding that organisations' positioning results from either and turns out to be the only viable way to optimise their performance. It has become more evident that there is now less emphasis on the exogeneity but rather emphasizes the organisations' ability to actively shape the development of some of their environmental elements like technology standards and customer preferences (Vecchiato, 2012:437).

Organisations can actively do something more than simply positioning itself in its environment but they can actively work to push the environment to be more on their favour. The argument for a new dimension is then toward the perspective that an organisation has control which measures the amount of control the organisation has on the components of its environment thus being endogenous to their own efforts (Vecchiato, 2012:437).

Two further approaches to strategic management of environmental uncertainty are identified as the visionary and transformative approaches. The visionary approach focuses on the notion of heroic insightful and entrepreneurial actions where this approach has strong connections to the planning school and envisages the

organisation as building the environment by imagining the future possibilities and working proactively to bring them to fruition (Vecchiato, 2012:437).

The transformative approach has strong connections with the adaptive school of reasoning which suggests that firms should not focus on their actions on prediction but rather creating co-creating goals with other business ecosystem players and mutually supportive processes where action will precede clear and predictable outcomes. On the basis of higher and lower levels of the prediction and control dimensions it possible to derive the taxonomy for the Strategic management of environmental uncertainty: Framework of prediction and control in Figure 2.5.

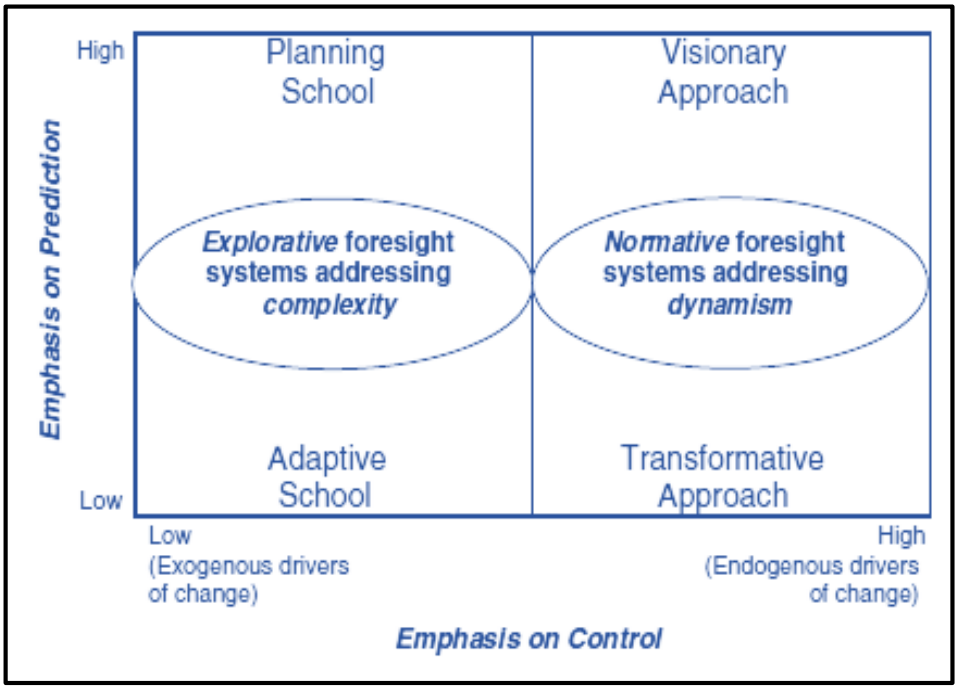


Figure 2.5: Strategic management of environmental uncertainty: Framework of prediction and control. Source: Vecchiato (2012:438)

Within the planning school specific foresight tools have been developed for improving predictions and informing major investment decisions under uncertainty and overall these tools encompass two main tasks; the first of which consists of environmental scanning and detecting new events and drivers of change. The second task focuses on the investigation of drivers of change in relation to their evolution, consequences on the organisation and the most suitable responses (Vecchiato, 2012:437-438).

The most commonly used techniques used for these investigations according to Vecchiato (2012:438) are:

- **Roadmaps**

  Roadmaps consist of representation as interconnected nodes of major change and events in some selected fields within the external environment such as science, technology and markets. The links between these nodes in themselves represent roadmaps which illustrates the temporal and causal relationships between nodes.
- **Scenarios**

  The aim of scenarios is to present various versions of the future that are fundamentally different in a coherent script like or narrative fashion which shows various credible and coherent stories that describe different paths leading to alternative futures.
- **Real options**

  Real options correspond to the application of financial option theory to investment decisions on real assets. This approach emphasizes that there are many initial investments that can create relevant follow-on opportunities which gives the firm the right to make these investments but not the obligation to make the future investments.

The discussion about Foresight and control has its basis rooted in the uncertainty within the environment and whether the complexity or dynamism is a predominant component does not interfere with the practices and techniques of foresight with respect to prediction, but rather it has a strong emphasis on control. In the mature global industries drivers of change generally lie within the macro environment and due to their large-scale nature, their huge numbers and tight mutual relationships, means that these macro forces are fundamentally beyond control or any influence from any major industry players (Vecchiato, 2012:445-446).

Firms therefore face great complexity by adopting an explorative approach which lies within the planning and adaptive schools. These firms cannot rely on their Political, Economical, Environment, Social and Technological landscapes and therefore have to pro-actively prepare for likely evolutionary paths of these drivers and seek to identify the most suitable responses to their paths. Tools like scenarios and real options are

very valuable for systematic collection, processing and organising knowledge about future events and likely changes in the macro environment which empowers executives for action as soon as uncertainty starts being resolve (Vecchiato, 2012:446).

Within highly dynamic industries the key disruptive drivers of change are relatively few and tend to be endogenous since they are rooted within technologies and customer needs, in which the development of both the firm can try and influence. Within this context leading firms may do more than to simply position themselves to optimise their performance in the face of likely outcomes and evolutions of drivers of change. This according to the visionary and transformative approach leads to understand that firms may pre-emptively seek to control the evolution of drivers of change to a certain extent, by playing an active role in the establishing and shaping of these drivers (Vecchiato, 2012:446).

These companies may not be able to build the future as they solely want it to be, but as they push diffusion rate of development of new technologies and move quickly into new emerging markets these technologies open up. Companies can try to affect the evolution of customer needs in ways that favour them and prepare effectively to benefit from those needs (Vecchiato, 2012:446).

Figure 2.5 illustrates the summative conceptual framework of the relationship between foresight systems and prediction and control. Foresight is placed in the middle of the vertical axis emphasizing the mediating approach to prediction in example as a planned learning process. Explorative systems which function in high complex environments on the left side are placed between the planning and adaptive schools emphasising the low control over exogenous drivers of change. Normative systems on the other hand are placed in the right side between visionary and transformative approaches which emphasizes the higher degree of control over endogenous drivers of change (Vecchiato, 2012:446).

In addition to the above literature there are certain main industry economic features that may also be considered and plays a critical part in devising a business strategy for a firm. The next section will be discussing these features.

2.4.1 Industry economic features

Strategic management literature defines the micro and macro environments by distinguishing sectors with which the firm has direct contacts and directly affects its business strategy from sectors that affects them in return. The micro environment is made up of competitors, customers, suppliers, potential incomers, substitute products and providers of complementary products. The macro environment is made up of the political, economic, ecologic, societal and technological landscapes political, economic, environmental, social and technological which surround the business environment (Vecchiato, 2012:437).

Industries differ significantly which complicates the task of analysing the industry and competitive environment in which the company operates and it is therefore important that the dominant economic features are identified. Table 2.3 shows those economic features that can be analysed to gain a better understanding of the environment and the questions asked for each (Hough *et al.,* 2011:59-60).

Another aspect mentioned is that environmental scanning has been guided by the primary assumption that detecting changes in the environment is ultimately the responsibility of top management of the company. In research conducted it was found that there are significant differences in the environmental scanning frequency, information usage and scope. Research has further shown that there is a definite role of boundary spanners that is defined as individuals that channel the environmental information into the company and feeds into appropriate corporate functions or directly to top management of the company (Rohrbeck, 2011:15).

In a study conducted to test the impact environmental scanning had on a firm's ability to build new competencies it was found that it had positively influenced the firms thus building the basis for considering environmental scanning as a vital component to managing discontinues change (Danneels, 2008:519).

Table 2.2. Evolution of strategic management systems

	CONTROL	LONG-RANGE PANNING	STRATEGIC PLANNING	STRATEGIC MANAGEMENT	STRATEGIC ISSUE MANAGEMENT	SURPRISE MANAGEMENT
Purpose	Control Deviations and manage complexity	Anticipate growth and manage complexity	Change strategic thrusts	Change strategic thrusts and change strategic capabilities	Prevent strategic surprises and respond to threats/ opportunities	Minimize surprize damage.
Basic assumption	The past repeats itself	Past trends Continue into the future	New trend and discontinuities	Expect resistance. New thrusts demand new capabilities.	Discontinuities faster than response	Strategic surprises will occur
Limiting assumption	Change is slower than response	The future will be like the past	Past strength applies to future thrusts. Strategic change is welcome	The future is predictable.	Future trend are OK	Future trends are OK
	← Periodic →				← Real time →	

Table 2.3. What to consider in identifying an industry's dominant economic features

ECONOMIC FEATURES	QUESTIONS TO ANSWER
Market size and growth rate.	• How big is the industry and how fast is it growing? • What does the industry's position in the life cycle reveal about the industry's growth prospects?
Number of rivals	• Is the industry dominated by large companies or fragmented into smaller companies? • Is the industry scaling down and competitors becoming less?
Scope of competitive rivalry	• What is the geographic area like? Global, multinational, national, regional or local. • Is the need for a presence in foreign market becoming a necessity for competitive advantage?
Number of buyers	• Is market demand fragmented among buyers? • Are there buyers who have buyer power due to purchasing large quantities?
Degree of product differentiation	• Are rival products becoming more or less differentiated? • Are lookalike products causing price competition?
Product innovation	• Is the industry characterized by rapid product innovation and short product life cycles? • How important is R&D in the industry and product innovations? • Is there the opportunity to overtake key rivals by being first-to-market or with next-generation products?
Supply / Demand conditions	• Is there a surplus capacity pushing prices and profits down?

	• Are there too many competitors overcrowding the industry? • Is there a short supply creating a seller's market?
Pace of technology change	• What role does the advancement of technology play in the specific industry? • Are there on-going upgrades of facilities or equipment essential due to rapid advancing production process technologies? • Do industry members have or need strong technological capabilities?
Vertical integration	• Does the industry players operate in a single part or do some competitors operate in multiple stages? • Is there any cost or competitive advantage or disadvantage associated with being fully or partially integrated?
Economies of scale	• Is the industry characterised by economies of scale in purchasing, manufacturing, advertising, shipping or other related activities? • Do companies with large scale operations have an important cost advantage or disadvantage over small scale companies?
Learning and experience curve	• Are there certain activities in the industry that is characterised by strong learning/ experience effects such that unit costs decline as a company experience is the performing those activities decline? • Do industry competitors have significant cost advantages due to their learning/experience in performing a particular activity better?

Source: Hough *et al.* (2011:59-60)

It has been proven that environmental scanning is needed to create sound, up-to-date knowledge about the direction and magnitude of emerging external change. This is a very challenging aspect considering that corporate change is characterised by long periods of slow, incremental change and short periods of rapid discontinuous or radical change which leads to the cause for companies to develop two types of capabilities. The first is the ability to adapt incrementally and exploit current business in times of incremental change and the second is the ability to adapt radically and explore new markets and business opportunities in times of discontinuous change (Rohrbeck *&* Gemünden, 2011:233).

From a resource based view of strategic management the understanding shows that firms which achieve and maintain a competitive advantage by viewing the firm as bundle of resources (human, processes, practices, and more) that are unique to each firm. These bundles of resources compared to other firms results in the firm's competitive advantage. It has been proposed that in the newer dynamic markets companies should be able to renew their portfolio of strategic resources which is referred to as a firm's dynamic capabilities (Rohrbeck & Schwarz, 2013:1595).

Various authors have suggested that these dynamic capabilities can be built on existing processes such as alliancing, product development, and strategic decision-making, while it is also argued that dynamic capabilities need resource cognition. Resource cognition refers to how managers conceptualise resources and how well they know the critical resources of the firm. The processes as a whole can be explained in four phases:

- Search and selection of new resources;
- Decision-making as to which should be adopted;
- Configuration and deployment; and
- Implementation.

Figure 2.5 shows the process based on Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece and Winter (2007:7-17). Using this model as a framework of reference it could be seen that strategic foresight potentially supports all four processes which lead to the overall increase in the firm's evolutionary fitness. If a firm's sees that there is a change in the environment, an impact assessment on the organisation has to be conducted to help aid a response strategy. The use of additional methods for gathering

information is required to help making decisions and thus forms a constructive process where multiple sources of information is required to create meaning (Rohrbeck *et al., 2013:* 1595).

In the modern economy information is found in the form of data that is intertwined in the global economy where like other essential factors of production such as hard assets and human capital, much of the modern economic activity could not take place without this data. Big Data refers to large pools of data that can be brought together and analysed to uncover patterns and help make better decisions. This will become the basis of competition and growth for individual firms, enhancing productivity and creating significant value for the world economy by the reduction of waste and increasing the quality of products and services (McGuire, Manyika & Chui, 2012).

The use of Big Data is becoming a crucial part of companies that can lead and outperform their peers where in most industries established competitors and new entrants alike can leverage data driven strategies to innovate, compete and capture value. Big Data will aid the creation of new growth opportunities and entirely new categories of companies, where many of these companies will sit in the middle of large information flows where data about products and services, buyers and suppliers, consumer preferences and intent can be captured and analysed (McGuire *et al.,* 2012).

An important factor to understand with Big Data is the sheer scale of the data but also the real-time and high frequency nature of the data. This can be used to use active "nowcasting" which is the ability to estimate metrics like consumer confidence, immediately which could only be done in the past in retrospect that is now more extensively used along with the power of prediction (McGuire *et al.* 2012) but in this case it would be used in conjunction with Foresight. McGuire *et al.* (2012) explain how Big Data can be leveraged in the following broadly applicable ways:

- It can unlock significant value by making information transparent. There is a great deal of information that still needs to be captured in digital form.
- As organisations create and store more transactional data in digital form it become easier to collect more accurate and detail performance information on various aspects ranging product inventories to sick days taken.

- Big Data allows the ever-narrowing segmentation of customers and therefore helps make much more precisely tailored products or services.
- The use of sophisticated analytics can substantially help improve decision-making, minimise risks, and unearth valuable insights which would have remained hidden.
- Big Data is able to help create next generation products and services.

Another advantage of using Big Data is that you can use it to gather information on employees. This then can be utilised as a coaching system where it can empower the organisation to more effectively coach their employees by understanding their unique needs. Big Data can also be used to uncover certain insights of top performers where those traits can be taught to other employees (Baker, 2014).

The application of Big Data to foresight lies within the aid it provides to managers in interpreting data and applying the information given to make better decisions. It helps managers navigate the uncertainty in the business environment better. If a company has strong dynamic capabilities it enables the company to identify changes in society and environment quicker and allows them to react to maintain their competitive advantage.

Referring back to Figure 2.5 it can be seen that scenarios can be used to describe different ways in which the environment could evolve and how the firm can prepare for a response to these changes. These scenarios can be seen as challenging and visionary strategic alternatives (Bezols, 2010) that can contribute to management's ability to take future-orientated decisions and initiate the configuration and utilization of the firm's strategic resources (Danneels, 2011) which supports the second and third phase of the Dynamic process in Figure 2.6.

The advantage of using scenarios is the fact that these help share the mental images that helps build emotional capacity to deal with scenarios. The benefit of creating this emotional capacity is regarded as being vital for driving the internal change process, particularly in the case where the change is radical. Thus emotional capacity serves as the driving force for the firm's implementation of the strategy concerning the fourth phase of the dynamic capabilities process (Rohrbeck *et al.,* 2013).

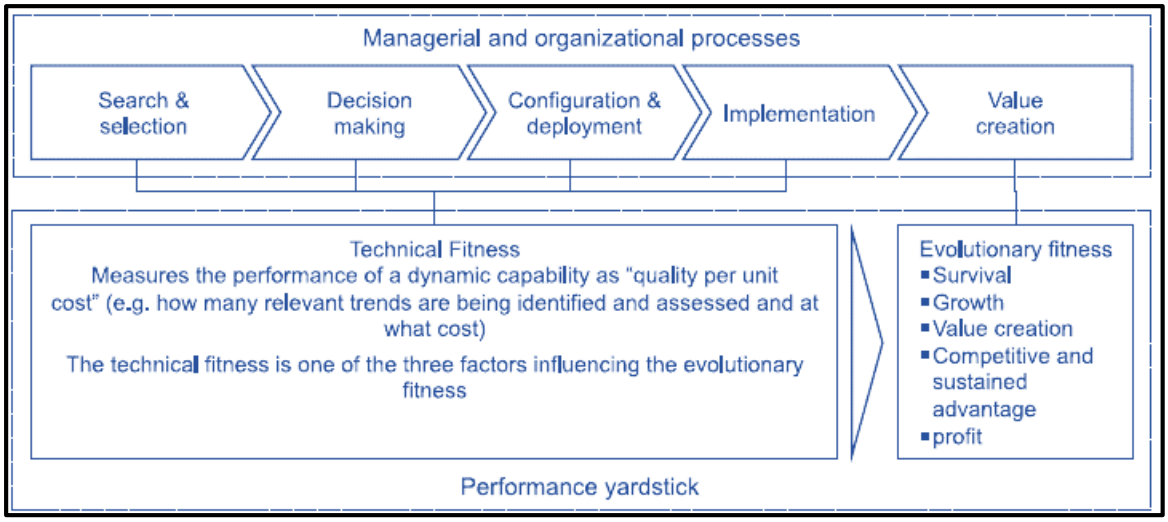


Figure 2.6: Process model of dynamic capabilities. Source: Helfat *et al*. (2007:7-17); Rohrbeck *et al.* (2013:1595)

Foresight practices and tools for coping with uncertainty has had uneven success where in the vein of the learning school, criticism has addressed the theoretical foundations of strategic foresight by illustrating that it is impossible to make reliable predictions. It has been proven to make accurate short-term predictions, but when coming to medium and long-term prediction forecasting begins to diminish as political, economic, social and technological drivers change interact in novel ways and environmental uncertainty increases. There is a strong emphasis placed upon the idea that firms should learn to be strategically agile and flexible (Vecchiato, 2012:438). These characteristic are directly applied to foresight and can aid an organisation in how it adapts to the new strategic plans.

2.5 INNOVATION MANAGEMENT

From the above literature it can be seen that innovation plays a major role in the foresight activities of an organisation. From this there arises an overall question of how innovation management should aid organisations building structures and capabilities to continually create new products, change internal processes, and develop new markets to ensure long-term competitiveness. There are two major research streams that are of particular importance: radical innovation and technological disruptions. The main focus of these research streams focus on the fundamental aspects of how these changes occur or are created within large companies and how these companies manage endogenous and exogenous change proactively (Rohrbeck, 2011:25).

Furthermore, according to Van der Duin, Heger & Schlesinger (2014:63) when evaluating the development of innovation management there are four different generations form which it stems forth:

- Technology push: In this case the innovation processes are linear and rooted in scientific discoveries and technological knowledge, leading to the development of new and existing products and services.
- Market pull: Innovation processes are still linear but are starting to discover market and societal needs from the innovation process perspective which leads to the development of new products and services aimed at satisfying the previously identified market and societal needs.
- Parallel processes: these innovation processes start with new technologies or with new market needs and the process itself becomes less linear where there are now feedback and feed-forward linkages established.
- Innovation in systems and networks: In this generation innovation processes are distributed among different organisations which contribute to the innovation process with complementary assets.

Within each of these generations companies have been using them to overcome disadvantages of the previous one to improve internal innovation processes to maintain their competitive advantage over their competition. Even though they occur sequentially the fourth generation does not completely replace the first three but there is a stronger focus on the fourth generation innovation process with its networked character (van der Duin *et al.,* 2014:63).

2.5.1 Radical Innovation

In times of radical change and discontinuities it is perceived that companies that are first to perceive and understand a trend, will be in the position to gain competitive advantage. Research in the field of radical innovation searches for capabilities that makes it possible to generate discontinuous leaps that will bring out new generations of products that will outclass those of rivals. Innovations can be classified as radical when they can deliver a five or tenfold increase in product performance, produced entirely new product performance measures or if they have produced a cost reduction of at least 50%. The innovativeness can be divided into four measurable dimensions

which consist of the market, technological, organisational and environmental dimensions (Rohrbeck, 2011:29).

Four major findings in the radical innovation research paradigm have been found. The first of these is that large companies should manage radical and incremental change differently where radical innovation requires different strategies and other organisational structures. A radical innovation management system should have three core competencies which consist of being able to discover, incubate and accelerate. It has also been found that process formalisation, early cross-functional integration and top-management support negatively influence the success of radical innovation (Rohrbeck, 2011:29).

The second finding focuses on the willingness to cannibalise current products for the sake of new products required to develop radical innovation and this need to cannibalise has to be created in top management's minds. Three factors to drive a company to cannibalise has been identified and are, product champion influence, future market focus and the presence for internal markets for project selection (Rohrbeck, 2011:29).

Research has also shown that successful radical innovations in large companies are achieved often by committed individuals that can be described by traits (Champions) or by their role and functions (promoters). Additional to these roles, boundary spanners and gatekeepers were also seen as being critical to the innovation process and these two roles are associated with corporate foresight where technology scouts act upon these roles by bringing external knowledge into the company. It is important that key individuals in radical innovations should also be suitable as participants in vision building activities which have been indicated as key capabilities in both management of radical innovation and corporate foresight (Rohrbeck, 2011:30).

2.5.2 Disruptions

From a technological perspective the leaps in technology can easily cause incumbent companies to fail. According to Rohrbeck (2011:30) the five characteristics of these companies are as follows:

- Initial underperformance of emerging technology
- New technology usually provides new customer benefits

- The emerging technology is first introduced into a niche market
- New technology gradually increases performance until it reaches superiority over established technology and then captures the mainstream market
- When the new technology reaches the superiority the new entrant replaces the incumbent company in the mainstream market.

This theory had the flaw of limiting predictive capacity and was not very useful as a managerial tool but it did lead to a research stream that provided research into corporate foresight with three important findings. The first finding is that technological disruption is the most important driver of disruptive change. Technological discontinuity is followed by a phase of technical variations, allowing incumbents and new market entrants to propose new solutions until a dominant design emerges. Recent research has been extended into the fields where there are disruptions with a low level of technological change, product disruptions and disruptive business models (Rohrbeck, 2011:34).

The second findings are that incumbent companies need specific structures to be able to catch up with smaller new companies. A paradigm explains how these incumbent companies are too slow and ignorant to compete with smaller more agile companies or able to produce adequate responses in times of crisis. It has been concluded that companies need to enhance their strategic flexibility by building more agile organisational structures (Rohrbeck, 2011:34).

Another concept to consider is that of absorptive capacity which can be described as how a firm pertains to knowledge creation and the utilization that enhances the firm ability to gain and attain a competitive advantage. Indications are that absorptive capacity is positively related to organisational innovation and learning capacity where it has increased environmental scanning, alliances and corporate venture activities (Rohrbeck, 2011:34).

From another perspective absorptive capacity relates to the general capacity of individuals, groups, and firms to recognize the value of new information, choose what to adopt, and apply innovation. The essential concept is thus the idea that accumulated experience with adoption and invention improves the capacity to recognize and absorb high quality external ideas and create valuable inventions (King & Lakhani, 2011:2).

Two major success factors have been found in research on disruptions when attempting to manage discontinuous change. The first is the ability to forecast and foresight, for example, by being able to gather information on potential impact and direction of emerging discontinuities and the second, the ability to create insight from, by example, the interpretation of the potential discontinuity in a collaborative fashion in order to make insights become actionable (Rohrbeck, 2011:34-35).

There are three methodological innovation features which contribute to a specific way of opening up new perspectives on the future and innovation and potential structural transformation. The envisioning structural transformation in Foresight is challenging considering it is difficult to focus on different variants of established view rather than new paradigm shifts. It is important to understand the change in the conditions of change that leads to these alternative futures (Schirrmeister & Warnke, 2013:453).

In the first aspect the field of science, technology and innovation (hereafter referred to as STI) there is very high relevance to foresight activities which are driven by policy development to address socio-economic challenges such as sustainability, health and security. This leads to STI policies being very mission-orientated where the socio-economic impact becomes the key criterion for STI priority setting which influences the technological fields being chosen to develop. This is referred to transformative priorities that indicate the areas for collective experimentation with various solutions for societal problems (Schirrmeister *et al.*, 2013:453-454).

The second condition of change focuses on sustainability where the need for foresight methods that are able to unlock potential for paradigmatic change rather than highlighting incremental improvements along the current trajectories is a strong emerging trend. Research in the field of sustainability is emphasising the optimisation of current patterns of production and consumption is not sufficient to address the magnitude of the reduction required to preserve the earth's eco-sphere (Schirrmeister *et al.*, 2013:454).

Research has pointed out the need for more fundamental changes focused on transformative innovation, system transition, and systematic eco-innovation. The focus of these concepts are calling for transformative visions, scenarios and roadmaps challenging todays paradigm's and basic assumptions on system dynamics (Schirrmeister *et al.*, 2013:454).

From the third area is where systematic change need to be addressed is in the definition of innovation where early models had defined innovation as a linear sequence of functional activities which distinguished only between “technology push” and “market pull”. This model, however, is limited since innovation is the coupling and matching process where interactions is the critical element and innovation has been described as a multi factor process which requires intensive interaction at intra and inter-firm levels. The problem lies with the fact that dominant definition of innovation was seen as new products and processes that are introduced to the market, where companies were the main actors in this process and never questioned (Schirrmeister *et al.*, 2013:454).

There has been increasing phenomena where social innovation, service innovation, low-tech innovation, relational innovation and value innovation are being recognised as highly relevant innovation arenas extending the standard definition. Along with these phenomena the notion of open innovation which places the focus on the firm as the key innovation actor has been broadened towards social entrepreneurs, users, customers, public sectors and citizens being the new actors (Schirrmeister *et al.*, 2013:454).

It is evident that creativity is no longer exclusively assigned to specific professions but now extends to ordinary people and everyday life as opposed to designers, artists or entrepreneurs. This then leads to understand that the change in innovation can no longer be investigated as a change in direction or priority, but needs to be recognised as change of kind and thus future innovation landscapes may function according to different logic (Schirrmeister *et al.*, 2013:454).

The absorptive capacity of the firm which refers to the set of skills of organisations, routines and processes which they use to acquire, assimilate, transform and exploit knowledge to produce their dynamic organisational capability. These capabilities are then translated into creating a sustainable competitive advantage for the firm to survive over time which is based upon strategic resources identified beforehand for this purpose. Research about dynamic capabilities, shows that strategic resources have lost its value over time thus causing the need for firms to develop innovative capabilities and instruments that renew strategic resources for them in order to maintain their competitive advantage (Van der Duin *et al.,* 2014:64).

Over the last two decades there has been an increase in collaborations between different organisations that are driven by at least five trends within corporate innovation. These trends according to Van der Duin *et al.* (2014:64) are:

- Fast technological change and the increasing complexity of products;
- High innovation speed;
- Shortening product life cycle;
- Spread of knowledge in thee value chain and the concentration on core competencies; and
- Business models that integrate across various industries.

The primary goal for organisations is to create a sustainable competitive advantage, for example, by developing the ability to sense change and acquire necessary capabilities to meet changes, including the challenges resulting from the above listed trends (Van der Duin *et al.*, 2014:64).

2.5.3 Innovative Capabilities Audit framework

The importance of assessing innovative capabilities is critical since general managers are responsible for the innovation process and constantly have to make difficult decisions about which innovations will receive managerial attention and resources. Insight into the firms innovative potential and the barriers to innovation are necessary are necessary to make effective proactive strategic choices (Burgelman, Maidique & Wheelwright, 2009:8).

Innovation depends on technological as well as other critical capabilities of firms, in areas such as manufacturing, marketing and distribution, and human resource management. An example of this is a technology strategy that is designed to improve a products performance has to be accompanied by a technically trained sales force that can educate the customers regarding the new products performance advantages and by a high-quality manufacturing system (Burgelman *et al*., 2009:9).

Innovative capabilities exist at the business unit and corporate levels within firms. In terms of the business unit it refers to the particular strategy and resource commitment posture that can be defined due to its distinct set of products markets, competitors, and resources. The innovation audit identifies critical variables that influence the innovation strategies at this level. In the Corporate perspective the audit identifies the

critical variables that influence both the relationship between corporate and business unit levels in terms of innovation capabilities with regards to formulation and implementation of an overall corporate innovation strategy (Burgelman *et al*., 2009:9).

Business Unit Level Audit

The general innovative strategies at this level with respect to the development of new products and services and/or new production and delivery systems can be characterised in the following terms (Burgelman *et al.,* 2009:9):

- Timing of market entry
- Technological leadership or followership
- Scope of innovativeness
- Rate of innovativeness

There are five categories of variables illustrated in Figure 2.7 that influence the innovation strategies of a business according to Burgelman *et al.* (2009:9):

- The resources available for the firm's innovative capacity
- The capacity to understand the competitor's strategy and industry evolution with respect to innovation
- The capacity to understand technological developments relevant to business unit
- Structural and cultural context of the business unit affecting internal entrepreneurship behaviour
- Strategic management capacity to deal with internal entrepreneurial activities

Figure 2.7: Innovative Capabilities Audit Framework – Business Unit Level.

Source: Burgelman *et al.* (2009:9)

The impact of the first three categories is important inputs when formulating the business unit innovation strategies where the final two are important for the implementation of the business unit innovation strategies. These are discussed in detail in Table 2.4 showing the critical issues that need to be audited and the list is not exhaustive since additional items may be added to reflect the particulars of different situations. The five categories combined determines the strength of the business unit for formulating and implementing innovative strategies and the audit should address this as a whole as well (Burgelman *et al.*, 2009:10).

Table 2.4: Innovative Capabilities Audit Framework – Business Unit Level

1. Resource Availability and Allocation
• Level or research and development funding and evolution: - In absolute terms - As percentages of sales - As percentages of total firm Research and Development funding

- As compared to main competitors
- As compared to leading competitor

- Breadth and depth of skills at business unit level in Research and Development, Engineering, and market research.
- Distinctive competences in areas of technology relevant to business unit.
- Allocation of Research and Development to
  - Existing product/market combinations
  - New product development for existing product categories'
  - Development of new product categories.

2. Understanding Competitors Innovative Strategies and Industry Evolution

- Intelligence systems and data available
- Capacity to identify, analyse, and predict competitors' innovative strategies
- Capacity to identify, analyse, and predict industry evolution
- Capacity to anticipate facilitating/ impeding external forces relevant to business units' innovative strategies.

3. Understanding the Business Unit's Technological Environment

- Capacity for technological forecasting relevant to business unit's technology
- Capacity to asses technologies relevant to business unit
- Capacity to identify technological opportunities for business unit

4. Business Unit Structural and Cultural Context

- Mechanisms for managing Research and Development efforts
- Mechanisms for transferring technology from research to development
- Mechanisms for integrating different functional groups (Research and Development, Engineering, Marketing, Manufacturing) in the new product development process
- Mechanism for funding unplanned new product initiatives
- Mechanism for eliciting new ideas from employees
- Evaluation and rewards systems for entrepreneurial behaviour
- Dominant values and definition of success

5. Strategic Management Capacity to Deal with Entrepreneurial Behaviour

- Business unit level management capacity to define a substantive development strategy
- Business unit level management capacity to assess strategic importance of entrepreneurial initiatives
- Business unit level management capacity to assess relatedness of entrepreneurial initiatives to units core capabilities
- Capacity of business unit level management to coach product champions
- Quality and availability of product champions in the business unit

Source: Burgelman *et al.* (2009:10)

The Corporate Level Audit focuses on the ability of corporate management to exploit and identify synergies which introduces an additional dimension to the audit. The main focus is now placed on examining how the corporate innovative capabilities enhance the innovative capabilities at the business unit level and these can be characterized in terms of (Burgelman *et al.*, 2009:10-11):

The scope and rate of development of new products and services and/or production and delivery systems that derived from combining innovative capabilities across existing business units

- The scope and rate of new business development based on corporate research and design and technology development efforts, and
- The timing of entry with respect to the previous two.

Within the Audit there are also five categories of variables that needs to be considered where each correspond to a category at the business unit level but with a different emphasis which focuses on doing more than the business unit could do on its own. The five categories are listed below and can be seen in Figure 2.8 (Burgelman *et al.*, 2009:11):

- Resource availability and allocation (for example corporate research and development, cash availability for risky projects)
- The capacity to understand multi-industry competitive strategies and evolution(for example, corporate strategic planning for innovation)

- The capacity to understand technological developments (for example, multi-industry scanning and technological forecasting)
- Corporate structural and culture context
- Corporate strategic management capacity (for example, exploitation of synergies in innovation through “horizontal” strategies; internal corporate venturing and acquisition)

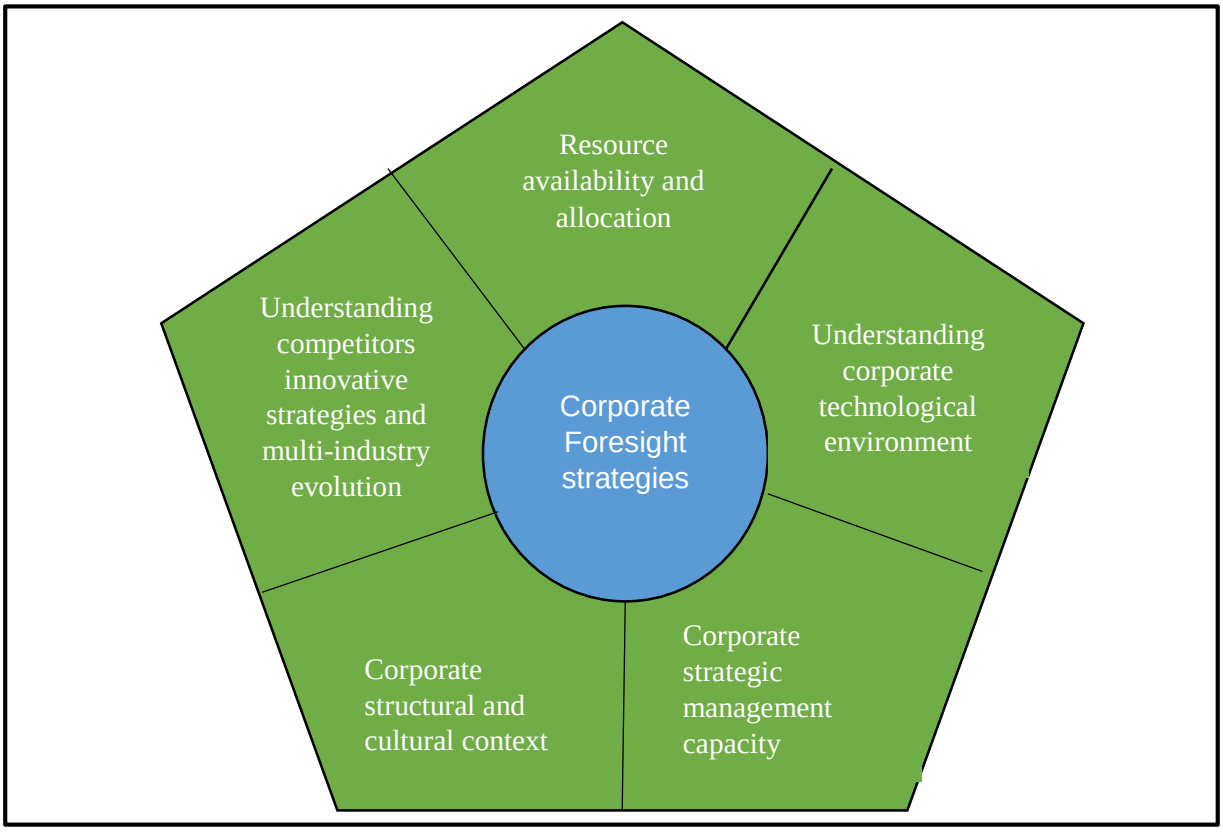


Figure 2.8: Innovative Capabilities Audit Framework – Corporate Level. Source: Burgelman *et al.* (2009:1)

Two important inputs in the corporate strategy formulation are the resource availability and corporate level capacities to understand the competitive and technological environment. Corporate structural and cultural context as well as corporate strategic management capacity, both serve as inputs for corporate strategy implementation. Table 2.5 lists these critical issues that has to be addressed in each category to carry out a corporate level audit (Burgelman *et al.*, 2009:10).

Table 2.5: Innovative Capabilities Audit Framework – Corporate Level

1. Resource Availability and Allocation • Corporate Research and Development and evolution - In absolute terms - As percentage of sales - As compared to average of main competitors - As compared to leading competitor • Breadth and depth of skills of corporate level personnel in research and design, engineering, and market research • Distinctive competences in areas of technology relevant to multiple business units • Corporate research and development allocation to - Exploratory research - Research and development of mainstream business - Research and development of business definition - Research and development of business development
2. Understanding Competitors Innovative Strategies and Multi-Industry Evolution • Intelligence systems and data available • Capacity to identify, analyse and predict competitors' innovative strategies spanning multiple industries. • Capacity to anticipate facilitating/impeding external forces relevant to firm's innovative strategies
3. Understanding the Corporate Technological Environment • Capacity for technological forecasting in multiple areas • Capacity to forecast cross-impacts among areas of technology • Capacity to assess technologies in multiple areas • Capacity to identify technological opportunities spanning multiple areas
4. Corporate Context (Structural and Cultural) • Mechanisms to share technologies across business unit boundaries

- Mechanisms to define new business opportunities across business unit boundaries.
- Internal and external organisation designs for managing new ventures
- Mechanism to fund unplanned initiatives
- Evaluation and reward system for entrepreneurial behaviour
- Movement of personnel between mainstream activities and new ventures
- Dominant values and definition of success

5. Strategic Management Capacity to deal with Entrepreneurial Behaviour

- Top management capacity to define a substantive long-term corporate development strategy
- Top management capacity to assess strategic importance of entrepreneurial initiatives
- Top management capacity to assess relatedness of entrepreneurial initiatives to the firm's core capabilities
- Mid-level management capacity to work with top management to obtain/maintain support for new initiatives (organisational championing)
- Middle-level management capacity to define corporate strategic framework for new initiatives
- Middle-level management capacity to coach new venture managers
- New venture managers' capacity to build new organisational capabilities
- New venture managers' capacity to develop a business strategy for new initiatives
- Availability of product champions to identify and define new business opportunities outside of mainstream activities

Source: Burgelman *et al.* (2009:12)

Even though there is a variety of concepts, tools, perspectives and roles that are important and useful to the management of technology, strategy and innovation, it is still however important to understand that the leadership of general managers is critical to the success of these endeavours (Burgelman *et al.*, 2009:12).

2.5.4 Managing Technology

The definition of managing technology is, according to White and Burton (2007:18) as follows:

> *"The management of technology is the linking of different disciplines to plan, develop, implement, monitor, and control technological capabilities to shape and accomplish the strategic objectives of an organisation."*

The importance of technology management along with innovation management has clearly been identified, but the focus should be placed on the area of managing technology itself as well. There are specific reasons for managing technology that individuals and organisations should be concerned about the management of technology. The reasons, according to White *et al.* (2007:18), are as follow:

- The rapid pace of technological change demand for a cross-discipline approach that will help aid economic development does occur to be much more efficient and effective and take advantage of technological opportunities.
- The rapid pace at which technological developments occur and the increasing sophistication of consumers has caused the life cycle of products to shorten. This forces organisations to become more proactive in the management of technology.
- Product development times has to be shortened along with more flexibility has to be developed in companies. Lead-time from idea to market must be reduced by the emergence of new altered technologies.
- The increase in international competition demands that organisations must maximise competitiveness by effectively applying new technologies to their operations.
- Changes in technology drive the changes in tools of management to adapt to the technology where the process of how to determine how those tools should function is still in its infancy.

Companies stumble for various reasons such as bureaucracy, arrogance, tires executives, poor planning, short-term investment horizons, inadequate skills and resources, and bad luck. *The Innovators Dilemma* highlights three important main findings when new technologies cause great firms to fail where the first one is the

sustaining technologies are different than disruptive technologies. The second is the pace of progress often precedes the markets awareness of the need and the third the structures of companies colour the choices and investments they make (Christensen, 1997; Marsden, 2013).

Sustaining refers to the incremental improvement of established technologies where disruptive is the new concept of value. When managers are faced with these disruptive technologies they fail their companies since they let organisational forces overpower them. Christensen (1997) and Marsden (2013) propose these five principles of disruptive technologies:

- Companies are dependent on customers and investors for resources. Customers drive internal decision-making because companies are resource-dependent.
- Small markets are not enough to solve the growth needs for large companies since they are too small and emerging and they have to wait too long.
- Markets that don't exist cannot be analysed.
- The capabilities of an organisation also define its disabilities.
- The technology supply may always equal the market demand.

The purpose for companies is to use these disruptive technologies to their advantage without hindering existing relationships with customers, partners, and stakeholders. The importance then to understand that disruptive technologies is a new way of doing things that initially does not meet the needs of existing customer needs and that they open new markets and destroy old markets (Baltzan, 2013:182).

During the 21st century organisations still lacked a proper tool to create and formulate new strategies and this was addressed by the introduction of the Business Model Canvas. The Canvas explains the rational of how organisations create, deliver and capture value (economic, social or other forms of value). The canvas ties together the *who* and the *how* to find the why. External influences are the environmental influences such as industry forces, market forces, key trends and macro-economic forces (Blank, 2012).

Existing companies and the operating divisions implement known business models and while using the business model canvas they can draw how their organisation is

creating, delivering and capturing value. The business model is filled with facts about the division or company and is illustrated in a canvas as shown in Figure 2.9. These operating divisions execute the known business model where the plans and processes are in place, and rule, job specifications, revenue, profit and margin goals have been set. Forecasts are based on a series of known conditions (Blank, 2012).

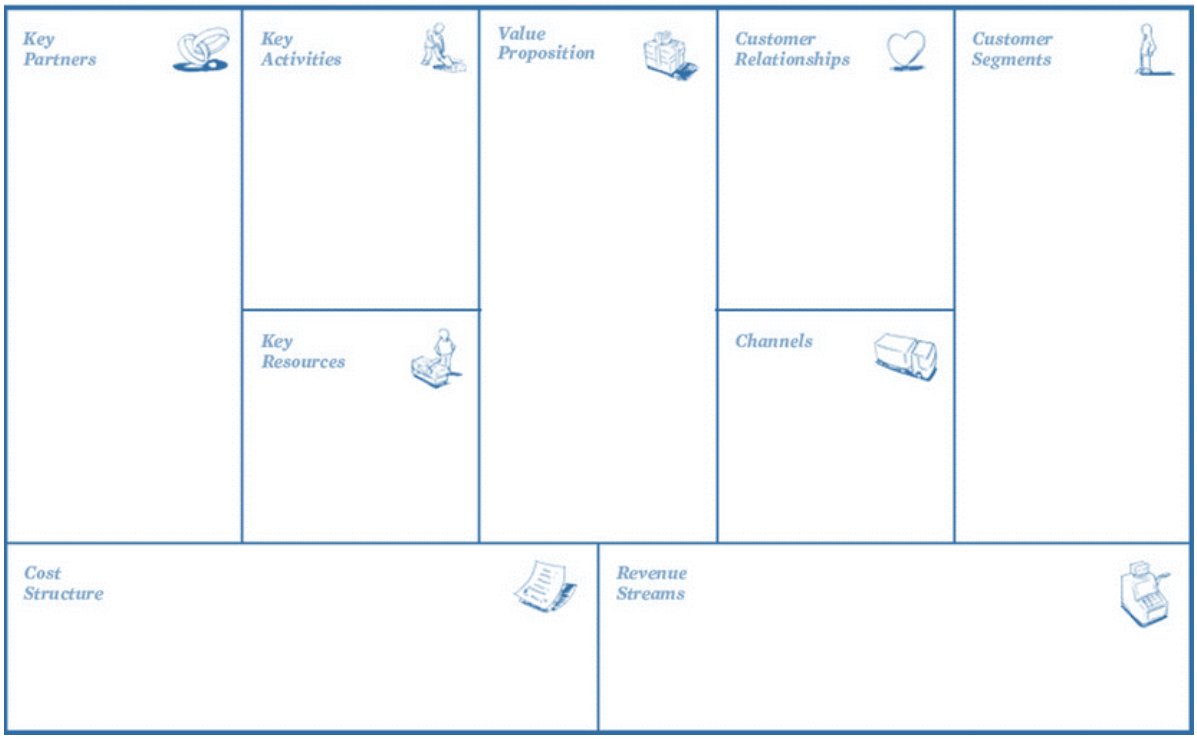


Figure 2.9: Business Canvas model. Source: Business Model Foundry (2014)

Understanding that technology is one of the main driving forces in pushing business to adapt new technologies, organisations have to make changes to accommodate the changes or function differently. The main trends according to Baltzan (2013:262) on the business side in the 21st century organisations are:

- The uncertainty in terms of future business scenarios and economic outlooks.
- Emphasis on strategic analysis for cost reduction and productivity enhancements.
- Focus on improvements for business resiliency via the application of enhanced security.

Research has shown that truly discontinuous innovations are new products or services that require the end user and the marketplace to dramatically change their past

behaviour, with the promise of gaining equally dramatically new benefits. In the technology adoption life cycle Figure 2.10 there are five stages that describe how people in organisations react. According to Moore's model of technology adoption life cycle (Burgelman, Christensen & Wheelwright, 2009:429) these are:

- Innovators. These are the people who are technology enthusiasts and are fundamentally committed to new technology on the grounds that sooner or later it would improve our lives. They love to play with new technology and to get their hands on the latest innovation.
- Early adopters. These are the visionaries whom want to use the discontinuity of any innovation too make a break with the past and start and entirely new future. Their expectation is that by being first to exploit the new capability they can achieve a dramatic and insurmountable competitive advantage.
- Early majority. Pragmatists are the people who make the bulk of all the technology infrastructure purchases and do not love technology for its own sake but are careful to employ new technology. They believe in evolution and are interested in making their companies' systems work effectively.
- Late majority. They are seen as the conservatives which are pessimistic about what they stand to gain from technology investment and undertake them only under duress, typically because the remaining alternative is to let the rest of the world pass them by. They are very price-sensitive, highly sceptical and very demanding. Rarely do their demands get met since they are unwilling to pay for the extra services.
- Laggards. These people are the sceptics which like to challenge the hype. They are not seen as potential customers but rather act as ever-present critics.

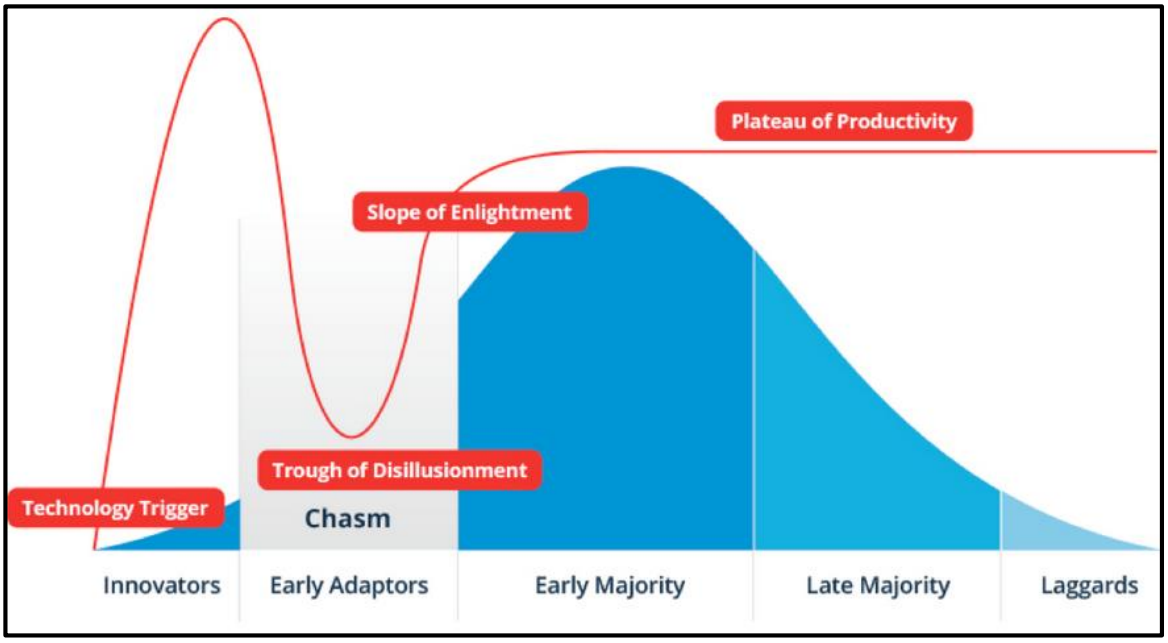


Figure 2.10: Technology Adoption Life Cycle. Source: Groschupf (2012).

There is a problem though that needs to be considered with the technology adoption life cycle. The pragmatist follows the visionaries, but is in essence very different in their underlying principles. The pragmatists take longer to adopt the new technologies thus causing a chasm in which the new technologies fall. If the new technologies could cross the chasm successfully they will gain acceptance within the main stream of the organisation or market (Burgelman *et al*., 2009:431).

In current research there are eight various exponential trends that will shape the future that are being studied. Due to the impact of technology there has been exponential growth which has created an abundance of unparalleled possibilities. The global community is entering a period of accelerated change where these changes have become exponential. Exponential changes bring down costs and size as opposed to performance that increases and the time are being compressed (Sparks & Honey, 2013).

Eight of these trends are being tracked according to Sparks and Honey (2013) and are:

- Century of the City State;
- Future Education;
- Citizen Doctor;

- 3D Printing;
- Quantified Everywhere;
- Conscious Brands
- Ancient Wisdom; and
- Cyborg Marketing.

In Figure 2.11 there are six best practices of innovation mentioned. These practices are as follows (Baltzan & Philips, 2010:506):

- Finding your relevant edge. Business needs to find relevant edges that will test and push their current performance.
- Assemble innovation hothouses. There needs to be motivated people attracted to these edges and working together around the challenging performance issues.
- Reward risk takers. Recognize that the people attracted to the edge are risk takers and provide environments that support risk taking and reward both success and failure.
- Celebrate diversity. The edge does not just foster risk taking, but also a very different culture that is also edgy and these cultures need to be protected.
- Look around. Ways need to be found how appropriate insights could be utilised from adjacent disciplines and even more remote areas of activity.
- Mix practitioners and developers. Here the users and developers of new technologies needs to be brought together where they can get into direct contact in order to evolve their practices to better use it.

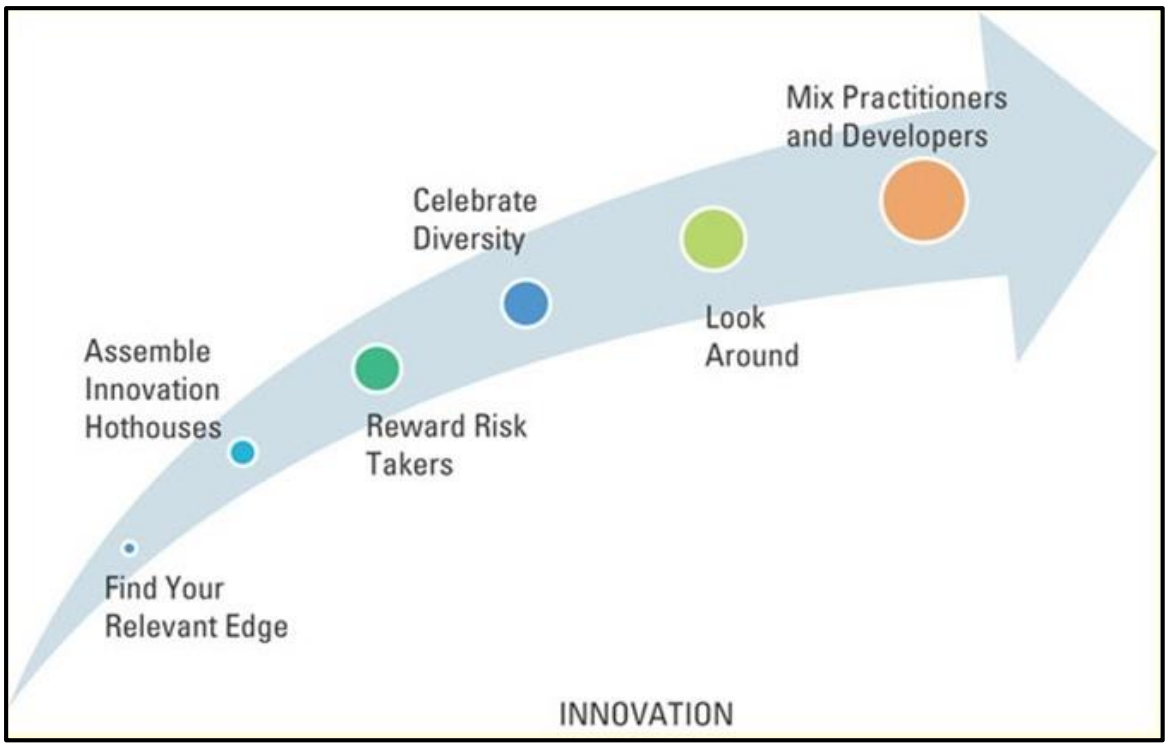


Figure 2.11: Six best practices of innovation. Source: Baltzan and Philips (2010:505).

On the technology side the focus revolves around improving business management of Information technology in order to extract the most value from existing resources and creating alignment between business and Information technology priorities. The organisations of today place immense focus on defending and safeguarding their existing market position in addition to targeting new market growth. The four primary information technology areas that are being focussed on are (Baltzan, 2013:262):

- Information technology infrastructures;
- Security;
- E-business; and
- Integration.

Over the last decades and the current climate in businesses a firm's attitude towards customers has become more crucial where the role of the customer has changed from being a mere consumer to one of consumer, co-operator, co-producer, co-creator of value and co-developer of knowledge and competencies. With the changes in the environment customers are also more prone to expect superior value and firms are

viewing their customer value as a key factor when seeking new ways to attain and maintain a competitive advantage. Three organisational capabilities that managers have to develop are the market orientation, knowledge management and customer relationship management (Martelo, Barroso & Cepeda. 2013:2042).

From a research based perspective, a firm can be regarded as a bundle of resources and capabilities across firms that persist over time. From this assumption the firms are seen to have resources and capabilities which are valuable, rare, inimitable and non-substitutable which can be used to implement value creation strategies that can lead to a sustainable competitive advantage. It is important to understand that firms do not only compete because they exploit these resources and capabilities, but also because of their ability to renew and develop organisations (Martelo *et al.,* 2013:2042).

From the Strategic technology management model in Figure 2.10 it can be seen how the established linkages between the organisations technological resources and objectives are maintained. Technology management can be clearly seen as a multifunctional and multidisciplinary field as it deals with all aspects of integrating technological issues into business decision-making and is directly relevant to a number of core business processes including strategy, innovation, new product development and operations management (Kerr, Farrukh, Phaal & Probert, 2013:1051).

From Figure 2.12 the following important iterations in the design are important to understand:

- Technology (technology resources) is in the centre of the framework.
- The protection process is shown as surrounding the technology base.
- The other four processes (Identification, Selection, Acquisition and Exploitation) are drawn as gears to illustrate that they need to bring together in order to be configured for use by the organisation.
- In order to utilize the framework in a given real-world context, there needs to be a co-ordination element that acts as the lubricant between all the processes.
- Around the outside of the framework there are three core business processes which are strategy, innovation and operations. These provide the necessary

connections between technology management and the wider business activities.

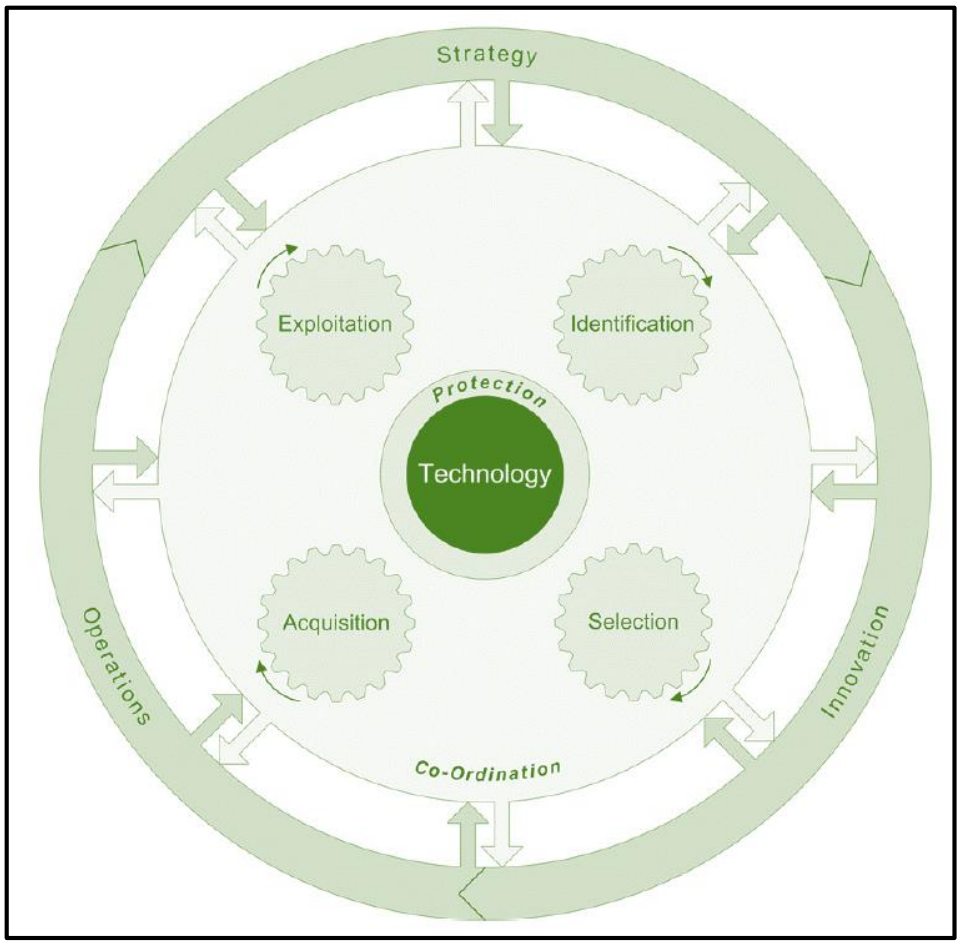


Figure 2.12: Strategic Technology Management Framework wheel. Source: Kerr *et al. (*2013:1053)

2.6 FUTURES RESEARCH PERSPECTIVE

Future research is used as a term to describe the whole range of research conducted to help organisations, individuals, and governments explore and prepare, and respond to changes in the environment. There is a problem concerning the vagueness of the term since the research contributing to the field is contributed from various research perspectives. The two main perspectives that are going to be discussed are the national economy perspective and the corporate perspective (Rohrbeck, 2011:35).

2.6.1 The National Economy perspective

After the Second World War many national governments were looking for ways to grow their national economies and thus commissioned technological foresight projects which aimed at identifying promising emerging technologies. This helped directing funding to those research areas to benefit maximum economic benefits along with the enhancement of quality of life. These national foresight projects were actively busy in identifying and assessing emerging technologies but were also focused on triggering research on methods and practises for exploring the future (Rohrbeck, 2011:39).

Concerning the corporate foresight process there has been a big contribution from studying the evolution national foresight practises. During the 1970s the main focus was on the use of mathematical models and trend exploration to make predictions about evolution of technology. In the 1980s it changed when limiting factors like weak identification signals for new technology and disruptive change hindered the use of past data to be extrapolated for future use. This had led to the next step which included the use of expert opinions and thus made the Delphi analysis method the choice for future research (Rohrbeck, 2011:39-40).

Originally the Delphi Technique was conceived as a way to obtain the opinion of experts without necessarily having to bring them together face-to-face. This technique is based on the Hegelian Principle of achieving oneness of mind through a three-step process of thesis, antithesis and synthesis. In the thesis and antithesis phases the participants are all allowed to present their opinion or views on a given subject, establishing the views and opposing views. The synthesis phase is used to bring the opposites together to form a new thesis where all the participants now take ownership of the new thesis and support it. This causes participants to change their views to align with the new thesis and there is a continual process of evolution where oneness of mind will be reached (Stuter, 1996).

Foresight projects have moved from prediction to exploration of possible developments and include more qualitative methods. The use of participation of stakeholders has also increased considering that it helps the creation of insight and then followed by actions. The focus from governments' perspectives of these projects is inclined to increase in research and design in the identified technological areas

which is assisted by online tools which aids in the reduction of costs and increased participation (Rohrbeck, 2011:40).

Measuring the success of national foresight programs also seem to be difficult since it is hard to link the activity to success and on-going research is till focussing on finding appropriate criteria for measuring the impact of foresight exercises. The success of these projects are best to be judged by level of social interaction and the resulting research and design collaborations that has been triggered, along with an alternative which is based on a multi-criteria frameworks that serve as a bias for measuring the impact of corporate foresight activities (Rohrbeck, 2011:40).

2.6.2 The Corporate perspective

During the 1950s and 1960s there was a strong correlation between how companies managed the technology focus of corporate innovations management where equality present in the way companies were exploring the future. As the innovation process changed over time to include the market perspective and later networking as a way to boost the company's own innovation capacity so did future research activities. The overall assumption of corporate foresight is the earlier detection of external changes will aid the company in increasing overall competitiveness (Rohrbeck, 2011:43).

The trend towards thinking about uncertain and possible futures has been prominent since strategic management was primarily focussed on planning how the company should be changed toward a desired new state and ensuring the transition by controlling the process. With the introduction of scenario analysis, companies started showing a different understanding of the future as to where various futures have been identified for the company to consider. Thus corporate foresight has changed from being focussed on predicting change to exploring possible changes (Rohrbeck, 2011:43).

In organisations it is seen that dominant logic hinders the acknowledgement of change and hinders the acceptance of alternative development paths, thus corporate foresight would be used to create doubt about basic assumptions in the organisation by conduction participatory foresight exercises. The additional benefits of using these participatory methods of exploring possible futures arise from the process itself since the process of scenario planning can play the role in strategic conversation and organisational learning (Rohrbeck, 2011:43).

From the research on radical innovation along with research in corporate foresight, the role of involved actors has also been discovered where these boundary spanners or scouts emerged as an important factor in the transportation of external information into the company. Foresighters are responsible for running foresight activities and facilitating the transition of weak signals to issues to recommendations and finally these are used for triggering actions (Rohrbeck, 2011:44).

Research has shown that failure within these foresight systems can be attributed to the lack of skill from foresighters leading the activities. From the findings on decision-making processes, corporate foresight research has adopted the paradigm that participation is crucial to the usage of foresight insights and to improve the rate of success of these activities experts and decision makers' needs to be integrated into the process. For this to succeed, motivation mechanisms has to be put in place and adapted to meet the expectations of each stakeholder and be aligned with the corporate context (Rohrbeck, 2011:44).

2.6.3 Futures research and Innovation management

Both innovation and futures research have been identified as being crucial to contributing to the success of organisations. The connection between futures and innovation research has been well established and the use within individual companies have shown insight to how futures research methods and the innovation processes can be combined and integrated, how technology intelligence processes can be organised and finally how corporate foresight affects companies innovative capabilities (Van der Duin *et al.*, 2014:62).

The aim of future research is to systematically explore, predict and/or explain future developments with the means of different methods and techniques, for example, scenario analysis, technology forecasting, roadmapping, and backcasting, s-curves, Delphi studies or mathematical models. These support companies efforts to sense change and adapt or renew accordingly and in this context the application of futures research methods can serve various goals such as testing strategies, or identifying ne business fields or new policy issues (Van der Duin *et al.,* 2014:64).

The link between futures based research and open innovations is apparent, since past research has shown insight into three trends driving open innovation. The first is the shortening of life cycles, the second the fast technological change and the third

the innovation speed which is the cause for companies to renew their strategic resources. The role for future research for corporate innovativeness is discussed in the form of foresight workshops (Van der Duin *et al.,* 2014:64).

These workshops are identified as one instrument designed to embrace the open innovation paradigm and as an instrument to increase the number of new innovations which is the second key factor listed above. The workshops are described as instruments for open innovation as part of the ideal generation stage of the innovation process and as inside-out and outside-in processes where contextual knowledge is brought into the company and internal knowledge and results are transferred to the outside for commercialization (Van der Duin *et al.,* 2014:64).

The main principles of the Cyclic Innovation Model in Figure 2.13 are that innovation is predominantly a cyclic interaction between different actors who exchange knowledge and information in the innovation arena and that every well-functioning innovation process should be based on one or more image of the future. There are two levels of detail in the model where the first links the future to innovation processes and the second level structure the partners involved in the innovation network and links them in a cyclic way where this cyclic nature of the relationships between the different actors means that there is constant feedback and feed-forward between actors (Van der Duin *et al.,* 2014:65).

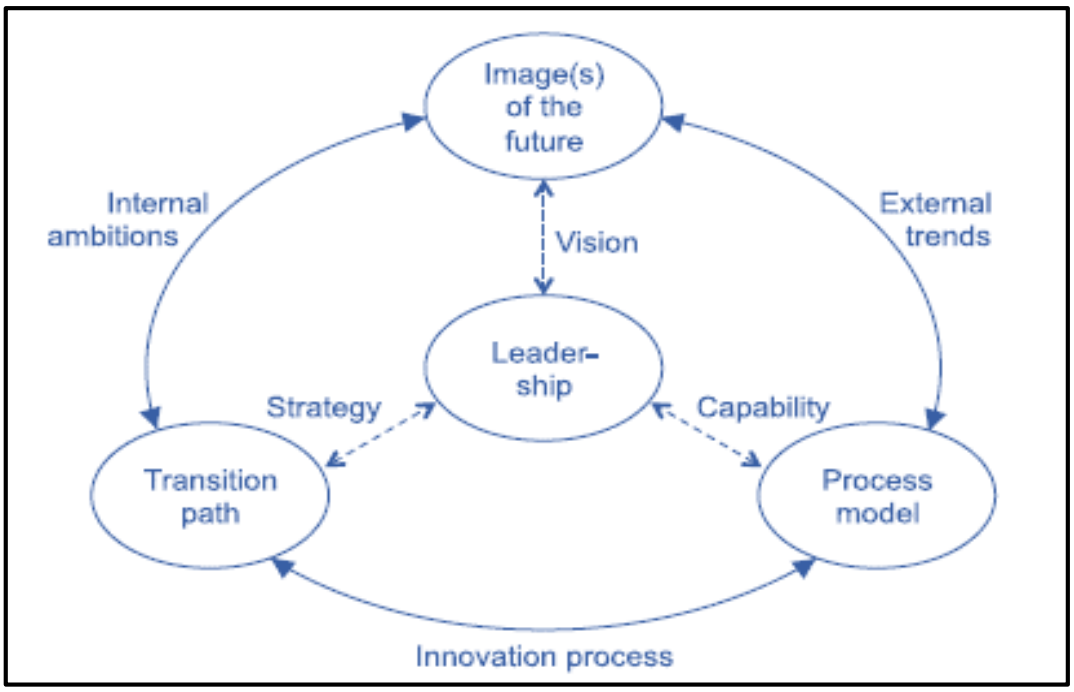


Figure 2.13: Cyclic Innovation Model. Source: Van der Duin *et al.* (2014:66)

The future-orientated part according to Van der Duin *et al.* (2014:65), of the model consists of four components which are:

- The image/images for the future which functions as guidance for all innovation related activities and is driven by the organisations' internal ambitions for the future as well as the awareness of external developments that may influence the organisations' future goals and performance.
- A process model that guides the organisation toward the envisioned future.
- The on-going innovation process together constitutes a transition path that leads the organisation from the present to the envisioned future.
- The inner component of the model which focuses on leadership and links it to the other three components where management is responsible for consistent, interconnected and balanced links between the other components. It also includes setting out an inspiring vision of the future, while ensuring that this future vision is strategically aligned with a sound process model that allows managing and executing the innovation processes adequately and the actual transition to the envisioned image of the future.

The cyclic nature seen in the model is inherent due to the constant feedback and feed-forward between the four components, leadership, image of the future, process model

and transition path. By means of an example the transition path aims at realising the once-set image of the future while at the same time, changes in the image of the future, like a change of the vision due to a change of leadership activities, could mean that the transition path has to be adjusted and the strategy needs to be updated (Van der Duin *et al.*, 2014:65-66).

2.7 SUMMARY

It is clear from the literature review that since the beginning of technological advances there had been a need to understand how it may impact the future and how governments and business should act accordingly to adapt to these changes. As the technological evolution took place the business environment had become more uncertain and the need for creating tools to deal with these changes had become a necessity.

In the modern business environment it is important to notice how this specifically has an impact on the strategic management, innovation management, technology management and future research. It has become a critical component for organisations to develop dynamic capabilities to be able to adapt to these changes along with the ability to adapt quickly in order to respond to changes within their environment.

Dynamic capabilities have a broader impact on the organisation when considering that it influences the strategic decision-making process and where resources should be allocated. The organisational culture and the ability to adapt to change have a large impact on the success of implementing these new strategic directives to help the firm stay profitable. There is a fine-tuned balance that needs to be maintained within the organisation to keep its competitive advantage.

The following chapter will be focussed on the research methodology and the measurement instrument used to measure these factors that play a critical part in the use of foresight.

CHAPTER 3
RESEARCH METHODOLOGY AND FINDINGS

3.1 INTRODUCTION

The literature review in Chapter 2 of this study has provided an overview of the various factors influencing foresight within the context of how it currently is utilised within the industry. Specific attention was given to the current foresight models and fundamentals, strategic management and foresight, innovation management and future research perspectives. Literature has shown that for companies to remain competitive within a fast changing business environment that they have to develop dynamic capabilities.

This chapter composes of the systematic approach followed to obtain the research objectives as explained in Chapter 1. The investigation procedures, data analysis as well as the results are described in this chapter. All statistical analyses were done by the Statistical Consultation Services at the North-West University on the Potchefstroom Campus, using the software package, SPSS 2011 edition.

3.2 PROCEDURE AND SCOPE OF THE QUANTITATIVE RESEARCH

The use of quantitative research methods is focussed on the measurement and analysis of causal relationships between variables within the value-free context. It aims to evaluate objective data consisting of numbers and the researcher makes use of complex structured methods to confirm or disprove hypotheses. Flexibility is limited to present any form of bias in the results. Quantitative research does not deal directly with everyday life, but rather with an abstraction of reality and aims to maintain an outsider's perspective that remains detached, objective and bias free (Welman, Kruger & Mitchell, 2011:8).

Quantitative research is also known as the positivist approach whilst qualitative research is known as the anti-positivist approach. The positivist approach uses research methods which are based on strict natural-scientific approaches which disregards the human experience associated with the person thus making them detached and objective. The anti-positivist approach focuses on the experience of the

human behaviour and understanding the human behaviour while they don't focus on finding the causal relations and general laws (Welman *et al.*, 2011:6).

The empirical study focused on the use of foresight as a managerial skill for making business decisions in higher academic institutions in South Africa. The demographic profile of respondents was based on reaching as many possible respondents working in Higher Academic Institutions. The use of foresight is not only done by managers but has its roots vested within all levels of the organisation therefore making it necessary to gain input from all levels of staff.

Finally, the empirical study attempted to assess the effective implementation of foresight as a skill within these Higher Academic Institutions. The effectiveness of this will indicate how dynamic the organisation is and how quickly it could adapt to its environment.

3.3 PROCEDURE AND SCOPE OF THE QUALITATIVE RESEARCH

Qualitative research implies that an emphasis is placed on the meaning and processes that are not rigorously examined or measured in terms of quantity, amount, intensity or frequency. The aim is to establish the socially constructed nature of reality, to stress the relationship between the researcher and the object of study as well as the value laden nature of the inquiry. This method deals with subjective data that is produced by the minds of respondents or interviewees and is presented in language form instead of numbers. The researcher tries to achieve an insider's view by talking to subjects or observing their behaviour and thus the researcher is working with the dynamic and changeable nature of reality.

Participants in the study had to complete specific questions which formed part of an indirect interview where they had to elaborate on the topic. These comments were analysed in a qualitative manner and used to add value to the results obtained from the quantitative research.

3.4 SAMPLE GROUP AND SIZE

When conducting research it is essential that the results obtained applies to a certain group of people. This group may be very broad, such as the entire population of the world or it could be very narrow, such as students attending a particular college or

university or a group that falls between these extremes. These groups possess certain characteristics such as working in similar institutions (Bernard, Whitley & Mary, 2013).

For the purpose of this study the population consisted of staff members working at Higher Academic Institutions ranging from Principals and Vice-chancellors to Lecturers. There were a total of nine Universities and 336 Further Education and Training Colleges including staff members at Universities in South Africa known to the author. The calculation of a sample size is important to ensure scientific and statistically significant results during the quantitative research process; however, it is difficult to get co-operation with all staff members to complete questionnaires.

The calculation of a sample size is important to ensure the scientific and statistically significance of results during the quantitative research process. The sample size indicates how valid the study will be along with the conclusions deducted from the research. In this case the task would have been not been feasible to get all the staff members from Higher Academic Institutions in South Africa to participate but does assist in identifying further areas for research.

The equation generally used to calculate a sample size required to be representative of the population in a research study when using random sampling is used is shown in Equation 3.1. Considering that a non-probability convenience sampling method was used in this study, Equation 3.1 is not relevant due to the fact that some members of the study population would not have been selected. Also including the fact that in the invitations, respondents were asked to forward the invite to others whom they knew would be able to contribute (Welman *et al.,* 2011:67). The demographic profile of this study will thus be used to establish that the sample used had been a representative of the population.

Equation 3.1 Sample Size

$$n = \frac{Z^2 \pi (1 - \pi)}{e^2}$$

Where:

n = the sample size required for the given parameters

Z= the number of standard deviations for the given accuracy

π= the proportion of sample of interest (a value of 0.5 maximises the sample size, therefore minimising the error)

e= the error allowable, for instance, 10% (Levine *et al.,* 2011:312)

The need for a probability sample was not necessary since the research was considered exploratory to develop a measuring instrument for how an organisation implements foresight. The targeted staff members were all considered to be contributing on various levels of the organisations' development and adaption to its environment thus creating a broad spectrum of contributions that would help develop the instrument.

The author utilized a non-probability convenience-sampling method. The convenience sampling refers to data collection from members of the study population conveniently available to participate in the study and chosen by the researcher as the best way to collect data quickly and efficiently due to very little variation in the study population (Weathington, Cunningham & Pittenger, 2010:205).

Another method of sampling used was Self-Selected since participants were invited to participate in the study (see annexure A). Self-selected sampling is used in group cases where participants essentially select themselves for the study. This sampling method was specifically selected to ensure voluntarily representation for Higher Academic Institutions in South Africa (Connaway & Powell, 2010:119).

All the involved Institutions were asked to complete questionnaires and redistribute the invitation to other staff members within the population. The questionnaires were submitted via the internet using Drupal. A total of 50 responses were generated from over 800 e-mail invitations that had been sent out. All the questionnaires were used as the online program had required participants to complete each field before they could move on to the next section. A response rate of 6.25% had been achieved from invitations sent to the population.

Non-responses in this study were expected and could have been due to:

- E-mail addresses were incorrectly listed.
- E-mail addresses were inactive and generated a non-delivery to the participant.
- Participants were not able to reach due to study leave, conferences and sabbatical research breaks.
- Refusal from participants without any reason.
- Participants were unable to make the short deadline of the study.

The length of the questionnaire could have been deterring to getting feedback from participants. The study required an in-depth and thorough questionnaire in order to lay the foundation for further areas of research and is reflected in the lengthy design of the questionnaire. Factors affecting the general population have been taken into consideration that they may be over worked and functioning in a pressured and stressful environment where they have little time to answer questionnaires.

3.5 SURVEY INSTRUMENT

There are two general approaches to gathering and reporting information which is qualitative and quantitative. Using the qualitative approach to research the focus is placed on understanding a phenomenon from a closer perspective. It is focused on describing the phenomenon in a deep comprehensive manner. The quantitative approach tends to approximate phenomena from a larger number of individuals using survey methods (Rhodes, 2014).

This instrument used a quantitative approach utilising a four point Likert scale to minimise indecisiveness combined with a limited qualitative approach. These were followed to achieve the research objectives as set out in Chapter 1. Participants to the study come from various institutions where they have little time to participate in studies and thus lead to the decision on using a quantitative approach would be the best approach to get the maximum number of results in the available timeframe. The limited qualitative approach was used to analyse the response gained from open-ended questions in the survey.

A questionnaire was used as instrument because it was inexpensive, easy to administer and quick to deliver to the respondents where they could answer at their

own convenience. Ethical clearance had been obtained from the Ethics Committee in the North-West University Research Support Office. The questionnaire was developed using Drupal web forms to ensure ease of use. Drupal is an open source web content management platform that is built, used and supported by an IT community worldwide. These webforms are Drupal module used to construct surveys (Drupal, 2012).

Surveys were distributed by the author through electronic distribution using e-mails which included a link to the relevant web form. Accompanying the e-mail is a letter explaining the purpose of the study. Participants were given 20 days to complete the questionnaire.

The questionnaire was constructed by the author based on the literature study conducted in Chapter 2. There was a sum amount of 102 questions of which question 91,101,102 was open-ended questions. Section A was covered by questions 1 to 9 which had focused on gathering demographic information from the participants, the remaining questions ranging from 10 to 100 gathered information using a 4-point Likert scale ranging from Strongly Disagree to Strongly Agree excluding a neutral option. In questions 6 and 91 provision was made for participants to elaborate on their answer in question 5 and 90 if they have selected “other”.

Each section had a short descriptive explanation to familiarise the respondent with the type of question though the questions are based on the literature (Attached in Annexure B). Section B was covered by the questions ranging from 10 to 22 which focused on foresight factors and styles where question 22 was focussed on placing participants within a certain group of personalities related to foresight styles. Section C consisted of question 23 to 42 which focused on the relationship between the various aspects of strategic management and foresight.

In section D focus was placed on innovation management within organisations with regards to its relationship to foresight and was covered by questions 43 to 79. Section E focussed on how organisations perceived the Future Research perspective and was measured by questions 80 to 100. In section E the various types of future studies used within in the organisations were tested with the option to elaborate if theirs was not there.

3.6 DEMOGRAPHICAL PROFILE OF RESPONDENTS

The population of the study comprised 50 participants of which 52% were male and 48% were female. In Figure 3.1 the age distribution of the population is displayed. The population comprises 8% aged between 26 and 30, 31 to 35 were 16%, 36 to 40 were 12%, 41 to 45 were 10%, 46 to 50 were 12%, 51 to 55 were 20% and 55-60 were 22%.

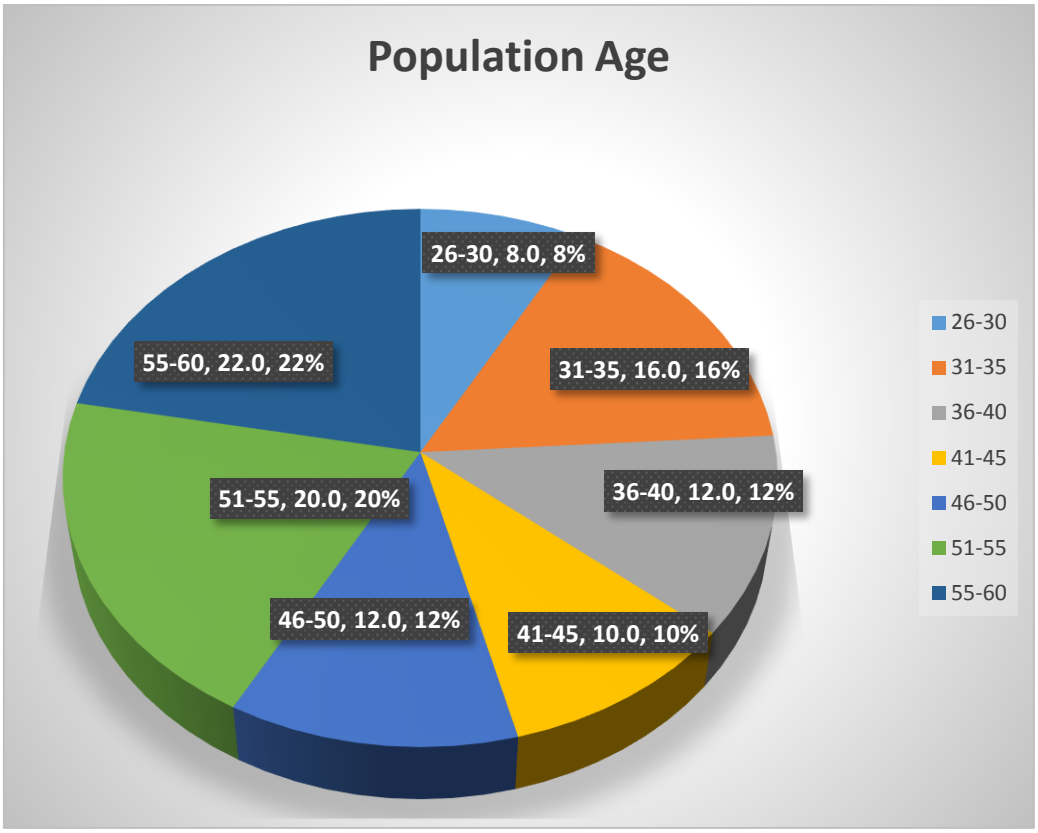


Figure 3.1: Population Age

Regarding participants qualifications, Figure 3.2 shows the distribution percentages. 2% had obtained certificates, 4% obtained National Diploma's, 12% had gained Bachelor's Degrees, 18% had obtained Honours Degree/ Post Graduate Diplomas, where 40% had obtained Masters Degrees and 24% had obtained Ph.Ds.

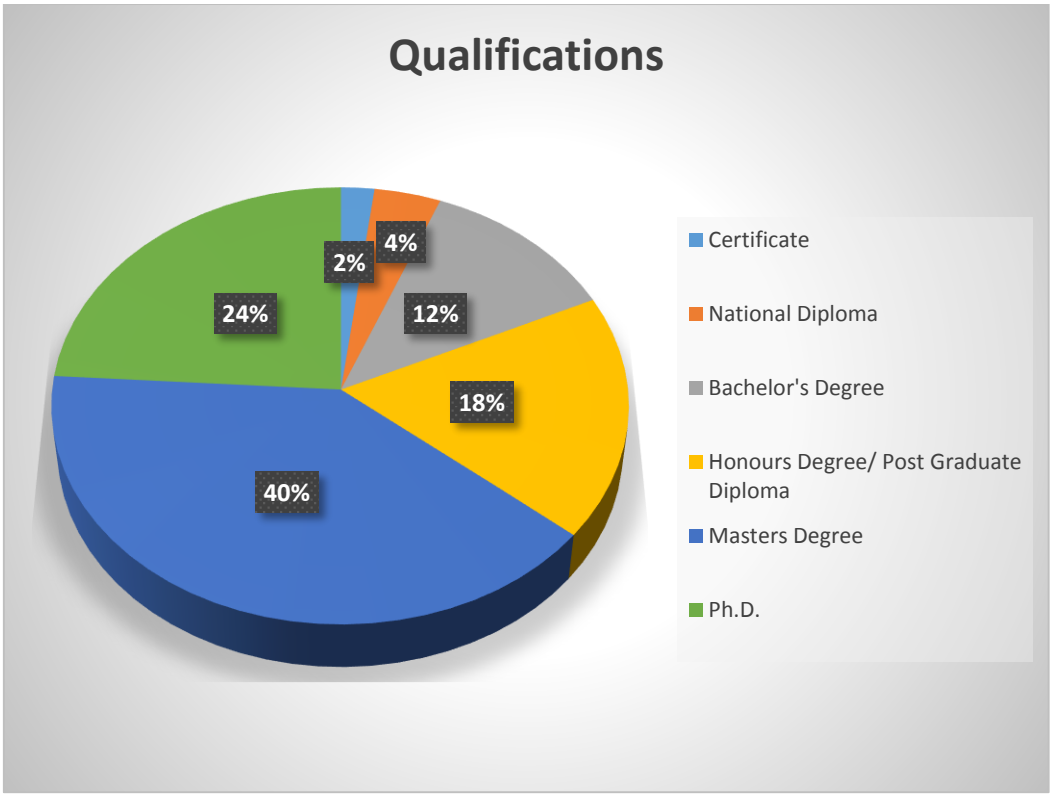


Figure 3.2: Qualifications

Participants' field of expertise from the study had indicated that 9 respondents in Arts, 6 participants in Natural Sciences, 1 participant in Theology, 14 participants in Education Sciences, 16 in Economic and Management Sciences, 1 participant in Law, 8 respondents in Engineering, 7 participants in Health Sciences and 7 in Technology Management took part in the survey.

From Figure 3.3 the participants' positions within their institutions are 4% as Vice Rector, 4% were Deans, 18% indicated being Directors, 4% were Campus Managers, 18% were Heads of Divisions, 8% were Senior Lecturers, 10% were Lecturers and 2% Junior Lecturers. The remaining 32% consisted of Vice Chancellor, Academic manager, Head of School, Administrator, Stats management, Senior Academic manager, Academic Director, Financial administration officer, Academic manager, Information Technologist, Coordinator, ISO Administrator and Financial Manager and Project Co-ordinator.

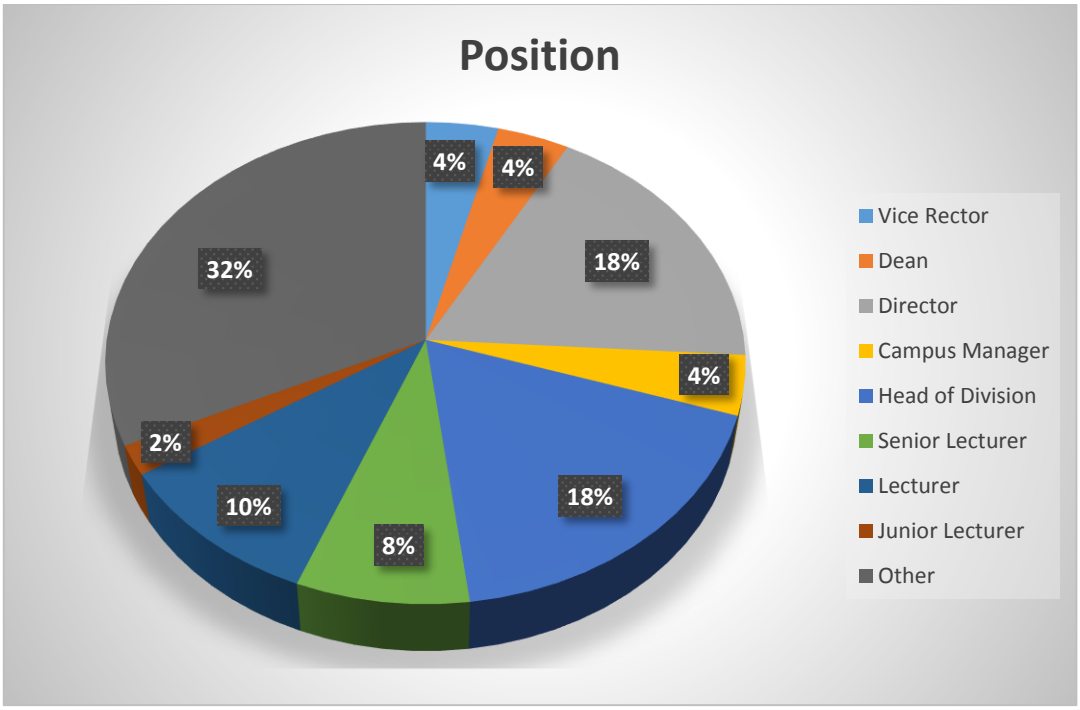


Figure 3.3: Positions

The respondents indicated when asked how many years they have been working at their Higher Academic Institution in Figure 3.4 that there were 28% which had 0 to 5 years, 24% had 6 to 10 years, 20% had 11 to 15 years, 12% had 60 to 20 years, 4% 21 to 25 years, 4% had 26 to 30 years and 8% had 30 years or more.

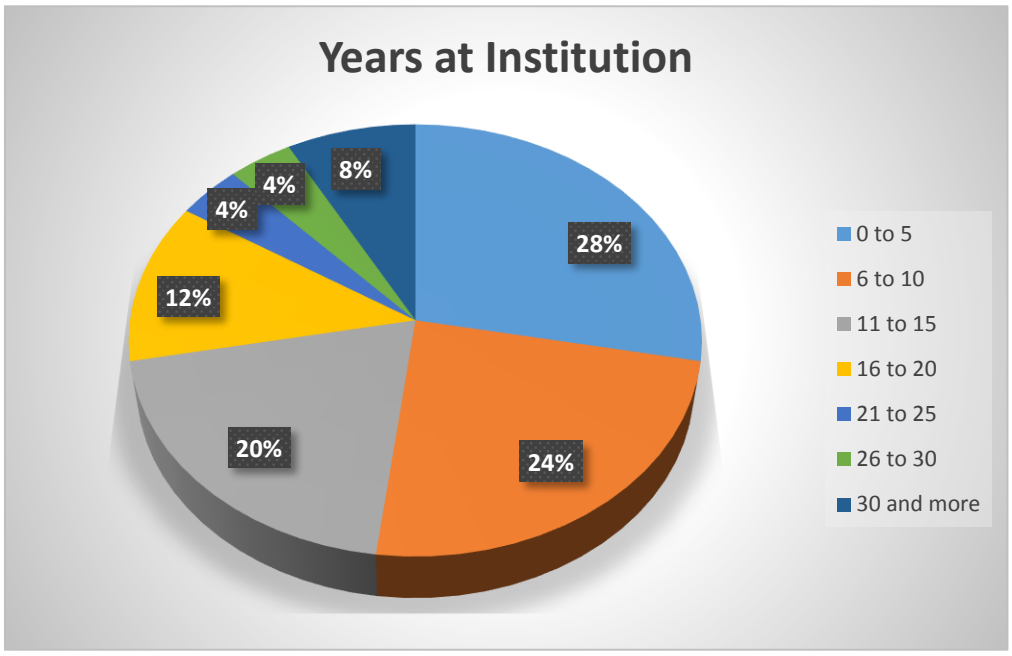


Figure 3.4: Years at Higher Academic Institution

Participants had been asked to indicate the institutions where they are working and had shown the following results: 74% of the participants had indicated that they work at Public Higher Education Institutions, 18% indicated working at Public FET Colleges, 6% are working at Private FET Colleges and 2% at SETAs. When asked whether they had collaborated with other Higher Academic Institutions the participants had indicated that 60% had collaborated and 40% had not collaborated.

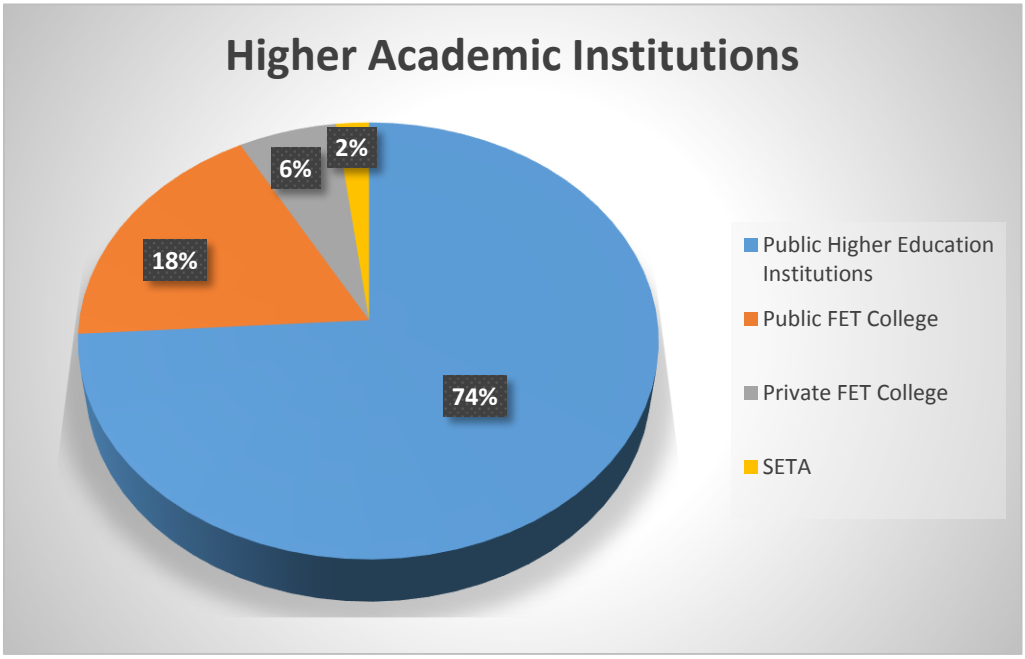


Figure 3.5: Higher Academic Institutions

3.7 EMPIRICAL STUDY: RESULTS

The SPSS software packages provided by the North-West University Statistical Services were used to conduct frequency analysis, descriptive statistics, reliability and internal consistency for the selected constructs including the correlations between the constructs. These results are discussed below with all questions being answered by the participants.

3.7.1 Frequency analysis and descriptive statistics

The following is an extract discussion of the descriptive statistics that are highlighted as the highest and lowest ranking values for the calculated frequencies, arithmetic mean ($\dot{x}$) and the standard deviation (S) of the research study questionnaire. Please

refer to Annexure C for the complete questionnaire summary of the frequencies and descriptive statistics.

3.7.1.1 Assessment of questionnaire results Section B

The results are shown in Table 3.1 and will be discussed starting with questions yielding the highest mean (ẋ) values for the respondent's perception of the degree to which they agree with the statements on foresight factors and styles:

- Question 10: The organisation is focused on following the development of new technologies. ẋ = 3.08 and S = 0.57
- Question 21: Their companies see change as an unnecessary event. ẋ= 3.02 and S= 0.82
- Question 14: They agreed that new trends have a major impact on how they operate within their business environment. ẋ= 2.90 and S= 0.74
- Question 12: They agreed that new trends are identified early on. ẋ= 2.72 and S= 0.67
- Question 15: They agreed that the use of new technology is welcomed by personnel. ẋ= 2.72 and S= 0.71
- Question 17: The use of new trends is applied to develop new technologies. ẋ= 2.70 and S= 0.71

The results indicate that respondents' organisations focus on the development of new technologies and understand that these trends have an impact on the organisation. These trends are identified early on and the use of these trends leads to the development of new technologies. The respondents indicated that staff members welcome new technologies, but there is a view where change is seen as being unnecessary.

Table 3.1: Foresight Factors and Styles

Questions	Number of responses	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard Deviation
10. We are focussed on following the development of new technologies. (C1)	50	0%	12%	68%	20%	3.08	.57
11. The application of new technologies in our institution is quickly adopted. (C2)	50	6%	40%	48%	6%	2.54	.71
12. New trends are identified early on. (C1)	50	4%	28%	60%	8%	2.72	.67
13. New trends are adopted quickly into the organisation. (C2)	50	4%	48%	46%	2%	2.46	.61
14. New trends has a major impact on how we operate within our business environment. (C3)	50	2%	20%	58%	18%	2.90	.74
15. The use of new technology is welcomed by personnel. (C3)	50	4%	30%	56%	10%	2.72	.70
16. New trends are accepted easily by personnel. (C3)	50	4%	46%	48%	2%	2.48	.61
17. We use the identified new trends to develop suitable technology to gain a competitive advantage from the new trend.	50	4%	32%	54%	10%	2.70	.70
18. We have a systematic design process which utilizes foresight. (C4)	50	12%	40%	40%	8%	2.44	.81

19. We have created new value networks with the use of foresight. (C4)	50	14%	38%	44%	4%	2.38	.78
20. There are sufficient organisational data collection systems.	50	8%	44%	42%	6%	2.46	.73
21. Our company sees change as an unnecessary event.	50	6%	14%	52%	28%	3.02	.82

Legend: C1: Construct 1 – New technologies and trend identification; C2: Construct 2 – Adoption of new technology and trends; C3: Construct 3 – Acceptance of new technologies and trends; C4: Construct 4- Systematic foresight used to build value networks.

Questions yielding the lowest mean (ẋ) values for the respondents perception of the degree to which they agree with the statements on foresight factors and styles:

- Question 11: The application of new technologies in our institution is quickly adopted. ẋ= 2.54 and S= 0.71
- Question 13: New trends are adopted quickly into our organisation. ẋ= 2.46 and S= 0.61
- Question 16: New trends are accepted easily by personnel. ẋ= 2.48 and S= 0.61
- Question 18: We have a systematic design process which utilizes foresight. ẋ= 2.44 and S= 0.81
- Question 19: We have created new value networks with the use of foresight. ẋ= 2.38 and S= 0.78
- Question 20: There is sufficient organisational data collection systems. ẋ = 2.46 and S= 0.73

The respondents had shown that the application of new technologies, trends and acceptance of new trends are not quickly adopted into the organisation. The organisations do not have a fully systematic design process which utilizes foresight and it has not led to the creation of new networks due to a lack of sufficient data collection systems.

Question 22 had been specifically used to measure the perspectives of respondents on how they see various foresight personality styles. Table 3.2 illustrates the results from the data.

The first personality description of question 22 described the futurist styles where participants had indicated a high ẋ = 3.18 and S= 0.48. 74% had related to this style with agree, 22% with strongly agree and 4% with Disagree.

The second personality was based on the description of an Activist style where the participants generated a ẋ = 3.22 and S= 0.47. 74% of participants indicated they agree, 24% strongly agreed and 2 disagreed.

Table 3.2: Foresight styles

Foresight Personality Styles	Number of responses	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard Deviation
1. I distinguish between trends and fads and have good knowledge of history. I observe my environment and inform others around me about possible consequences and what can be expected of the future.	50	0	4	74	22	3.18	.48
2. I am focussed on creating measures to ensure the best future is realized and gain insight form information about the future. I am motivated by my commitment to my goal.	50	0	2	74	24	3.22	.47
3. I am driven by surviving in the present and trying to change the future by assuring the present is as good as possible. I focus on quick changing fads and short-term goals.	50	8	30	48	14	2.68	.82
4. I get things done, specifically administrative tasks such as planning and organizing. I focus on the present but am interested in new innovations and can mobilize people to embrace the change from old to new.	50	0	6	60	34	3.28	.57
5. I understand problems and know how to work around them instead of solving them. I prefer that there is a balance in the	50	10	48	32	10	2.42	.81

working environment and that things don't have to change.							
6. I don't like new changes and prefer things the way they are. Change for the sake of changing isn't always good.	50	26	56	18	0	1.92	.67

The third personality was the Opportunist personality where participants showed a ẋ = 2.68 and S= 0.82. 48% of the participants agreed, 14% strongly agreed, 30% disagreed and 8% strongly disagreed.

The fourth personality in the question was the Flexist style where there was a ẋ = 3.28 and S= 0.57. The respondents indicated that 60% agreed, 34% strongly agreed and 6% disagreed.

With the fifth personality the Equilibrist was described and the participants indicated a ẋ = 2.42 and S= 0.81. The participants indicated 48% disagreed, 10% strongly disagreed, 32% agreed and 10 strongly agreed.

The final personality is the Reactionist style where there was a ẋ = 1.92 and S= 0.67. Participants had a 56% response to disagree, 26% to strongly disagree and 18% agree.

From the results above it can be seen that the participants are more prone to associate with Flexist foresight style and least with the Reactionist style. Of great importance is that each institution needs all of the above foresight styles. The Flexist style is associated with individuals whom are stronger on doing administrative tasks like planning and organising. They are grounded in the present and interested in new innovations which often come from Futurists and Activists which are also high scoring personality styles in the data. They are the groups who help implement change or can resist change.

Important to notice is that the Flexist has two types of individuals, first the persons who are more likely to become interested in the ideas presented and adopt the new concept, behaviour or innovation. The second will only adopt the new idea after it has been tested by others.

3.7.1.2 Assessment of questionnaire results Section C

When analysing the results in Table 3.3 regarding strategic management and foresight, these are the results. Questions yielding the highest mean (ẋ) values (values above 2.7) for the respondents perception of the degree to which they agree with the statements on strategic management and foresight:

- Question 25: Conducting an industry analysis is done when assessing the current strategy. ẋ = 2.78 and S= 0.71
- Question 26: Environmental scanning is incorporated in strategic planning sessions. . ẋ = 2.9 and S= 0.68
- Question 27: Strategies are adjusted to accommodate environmental changes. ẋ = 2.88 and S= 0.63
- Question 31: The organisation has co-created goals with other businesses. ẋ = 2.82 and S= 0.59
- Question 33: Creative/Innovative thinking is encouraged. ẋ = 2.9 and S= 0.71
- Question 34: Multi-disciplinary perspectives are taken into consideration with strategic planning. ẋ = 2.9 and S= 0.68
- Question 41: Building business networks is important to the organisation's strategy. ẋ = 3.22 and S= 0.55

From the responses it is clear that organisations should conduct industry analysis along with environmental scanning when planning and assessing the strategy. These strategies needs to be adjusted to the environmental changes and contributes to building co-created goals with other businesses. The use of innovative and creative thinking and multi-disciplinary perspectives are used to contribute to strategic planning helping the business grow its networks.

Questions yielding the neutral mean (ẋ) values (ranging from between 2.5 and 2.7) for the respondents perception of the degree to which they agree with the statements on strategic management and foresight:

- Question 24: Managers understand the changes in our industry. ẋ = 2.64 and S= 0.60
- Question 28: Our Company has the capacity to actively develop external elements. ẋ = 2.66 and S= 0.66

- Question 29: Our organisation is pushing the environment to be more in our favour. ẋ = 2.62 and S= 0.73
- Question 30: Entrepreneurial activities are used to build the environment. ẋ = 2.62 and S= 0.64
- Question 32: Alternative futures are used in planning. ẋ = 2.60 and S= 0.67
- Question 36: Roadmaps are used to determine the strategy of the organisation. ẋ = 2.54 and S= 0.78
- Question 37: Scenarios are used to determine the strategy of the organisation. ẋ = 2.62 and S= 0.64
- Question 38: Real options are used when determining the organisation's strategy. ẋ = 2.64 and S= 0.66
- Question 39: Resources cognition is applied to support new strategies ẋ = 2.58 and S= 0.67
- Question 40: Foresight is an in-formal part of strategic planning. ẋ = 2.68 and S= 0.74
- Question 42: The organisation controls its position in the market. ẋ = 2.58 and S= 0.70

From the above responses it can be seen that there is a need for improvement in how managers understand the environment they operate. Organisations need to develop the capacity to develop external elements, create and control the environment that they operate in and create one that favours them. This should be done by using entrepreneurial activates, evaluating alternative futures, roadmaps, scenarios, and real options. The organisations also have to see how they could allocate more resources to support their strategies. Foresight has to become a formal part in strategic planning.

Questions yielding the lowest mean (ẋ) values (below 2.5) for the respondents perception of the degree to which they agree with the statements on strategic management and foresight:

- Question 23: Managers become uncertain when there are too many external changes. ẋ = 2.16 and S= 0.62
- Question 35: Strategic planning is participatory with lower levels. ẋ = 2.36 and S= 0.90

The results from the above questions indicates that managers still have a good idea of what is going on and that strategic planning is not participatory with lower levels.

3.7.1.3 Assessment of questionnaire results Section D

When evaluating Table 3.4 which focuses on the way organisations manage innovation the following results were obtained from respondents. There were four main field that were focussed on which were radical innovation, disruptions, innovative capabilities audit framework and managing technology within the organisations.

Questions yielding the highest mean (ẋ) values (values above 2.7) for the respondents perception of the degree to which they agree with the statements on strategic management and foresight:

- Question 44: Innovation within the organisation has continually led to new products and/or services being designed. ẋ = 2.76 and S= 0.66
- Question 45: Innovation is a driver for change in internal processes. ẋ = 2.74 and S= 0.66
- Question 46: Innovation within our organisation has given us the competitive advantage over our competition. ẋ = 2.80 and S= 0.70
- Question 47: Innovation has been driven by technological knowledge. ẋ = 2.74 and S= 0.63
- Question 48: Innovation is driven by the discovery of market needs. ẋ = 2.94 and S= 0.59
- Question 59: Individuals recognise the value of new information in the organisation. ẋ = 2.82 and S= 0.66
- Question 60: Groups recognise the value of new information in the organisation. ẋ = 2.74 and S= 0.60
- Question 61: The institution recognized the value of new information in the organisation. ẋ = 2.84 and S= 0.51
- Question 62: Accumulated experience improves the innovation of the organisation. ẋ = 2.86 and S= 0.61
- Question 63: Factors that leads to change have been identified in our industry. ẋ = 2.84 and S= 0.55

- Question 64: Sustainability is taken into consideration when identifying new trends. $\dot{x}$ = 2.88 and S= 0.56

Table 3.3: Strategic management and Foresight

	Number of responses	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard Deviation
23. Managers become uncertain when there are too many external changes.	50	10	66	22	2	2.16	.62
24. Managers understand the changes in our industry.	50	2	36	58	4	2.64	.60
25. Conducting an industry analysis is done when assessing the current strategy.	50	4	26	58	12	2.78	.71
26. Environmental scanning is incorporated in strategic planning sessions. (C1)	50	2	22	60	16	2.90	.68
27. Strategies are adjusted to accommodate environmental changes.(C1)	50	2	20	66	12	2.88	.63
28. Our company has the capacity to actively develop external elements. (C2)	50	2	38	52	8	2.66	.66
29. Our organisation is pushing the environment to be more in our favour. (C2)	50	4	40	46	10	2.62	.73
30. Entrepreneurial activities are used to build the environment.	50	4	34	58	4	2.62	.64
31. The organisation has co-created goals with other businesses.	50	6	10	80	4	2.82	.60
32. Alternative futures are used in planning.	50	6	32	58	4	2.60	.67
33. Creative/Innovative thinking is encouraged.	50	2	24	56	18	2.90	.71

34. Multi-disciplinary perspectives are taken into consideration with strategic planning. (C3)	50	4	16	66	14	2.90	.68
35. Strategic planning is participatory with lower levels. (C3)	50	22	26	46	6	2.36	.90
36. Roadmaps are used to determine the strategy of the organisation.	50	6	38	52	4	2.54	.68
37. Scenarios are used to determine the strategy of the organisation.	50	2	40	52	6	2.62	.64
38. Real options are used when determining the organisation's strategy.	50	6	20	62	4	2.64	.66
39. Resources cognition is applied to support new strategies. (C3)	50	6	34	56	4	2.58	.67
40. Foresight is an in-formal part of strategic planning.	50	4	36	48	12	2.68	.74
41. Building business networks is important to the organisation's strategy.	50	0	6	66	28	3.22	.55
42. The organisation controls its position in the market.	50	4	42	46	8	2.58	.70

Legend: C1: Construct 1 – Sensitivity to operating environment; C2: Construct 2 – Company drives the market; C3: Construct 3 – Strategic planning is multi-disciplinary and all inclusive.

Respondents have consented that innovation has continually led to new products and/or services being designed. This is seen due to how respondents indicated that innovation is the driver for internal change and gave them a competitive advantage over competition. Innovation is driven by technological knowledge and the discovery of market needs. Individuals, groups and the institutions themselves realised the value of new knowledge within the organisation and agreed that cumulative experience improves innovation. The organisation knows its change factors and considers sustainability when identifying new trends.

Questions yielding the neutral mean (ẋ) values (ranging from between 2.5 and 2.7) for the respondents perception of the degree to which they agree with the statements on strategic management and foresight:

- Question 43: Internal entrepreneurship is encouraged. ẋ = 2.66 and S= 0.63
- Question 49: Innovation is deterred by the discovery of societal needs. ẋ = 2.54 and S= 0.71
- Question 50: The organisation's innovations process is sufficient in leading to the development of new services. ẋ = 2.50 and S= 0.61
- Question 52: There are feedback systems between new technologies and the new market need. ẋ = 2.50 and S= 0.58
- Question 53: Various departments contribute to innovation process. ẋ = 2.66 and S= 0.69
- Question 54: Radical innovations have never put our organisation at risk of losing market share. ẋ = 2.58 and S= 0.67
- Question 57: Technological disruptions are the most important drivers of disruptive change. ẋ = 2.60 and S= 0.67
- Question 65: We have a framework to audit our innovative capabilities of the whole institution. ẋ = 2.64 and S= 0.63
- Question 66: There is an audit framework that focuses on each department specifically. ẋ = 2.54 and S= 0.79
- Question 69: We are familiar with our competitors' industry evolution. ẋ = 2.54 and S= 0.71
- Question 71: Management values the strategic importance of entrepreneurial initiative. ẋ = 2.62 and S= 0.75

- Question 72: The organisation manages technology to its advantage. $\dot{x}$ = 2.68 and S= 0.71
- Question 73: Our technology management has a cross-discipline approach. $\dot{x}$ = 2.66 and S= 0.69
- Question 74: Our life cycles for products have shortened. $\dot{x}$ = 2.54 and S= 0.76
- Question 75: The organisation's idea to market lead-time is flexible enough to react quickly to changes. $\dot{x}$ = 2.57 and S= 0.71
- Question 76: International competition has pushed our organisation to apply new effective technologies. $\dot{x}$ = 2.57 and S= 0.71
- Question 77: Customers drive internal decision-making. $\dot{x}$ = 2.56 and S= 0.72
- Question 78: Disruptive technologies are implemented without hindering existing customer relationships. $\dot{x}$ = 2.56 and S= 0.72
- Question 79: Customers have become co-creators of value to the organisations' products and services. $\dot{x}$ = 2.56 and S= 0.72

From the responses it can be seen that internal entrepreneurship is encouraged and that there is a lack in the discovery of societal needs which both needs to be improved. Innovation within the company and departments is sufficient to lead to new services but also needs improvement. There has to be more constructive feedback between new technologies and the market needs. Radical innovations have put the organisations at risk before and technological disruptions have been considered as being a driver of disruptive change.

The organisations also have to improve on an audit framework to measure innovative capabilities. The organisations have a relative idea of their competitor's industry evolution. Technology can be better managed to gain a stronger advantage and the approach needs to be more cross-disciplined. Perceptions regarding product life cycle shows that it shortened but by small margins and idea to market lead time show that there is a need to improve the time the organisation takes to react to market changes.

Table 3.4: Innovation management

Statements	Number of responses	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard Deviation
43. Internal entrepreneurship is encouraged. (C2)	50	4	30	62	4	2.66	0.63
44. Innovation within the organisation has continually led to new products and/or services being designed.(C1)	50	2	30	58	10	2.76	0.66
45. Innovation is a driver for change in internal processes. (C3)	50	6	20	68	6	2.74	0.66
46. Innovation within our organisation has given us the competitive advantage over our competition. (C4)	50	2	30	54	14	2.80	0.70
47. Innovation has been driven by technological knowledge.	50	4	24	66	6	2.74	0.63
48. Innovation is driven by the discovery of market needs. (C7)	50	2	14	72	12	2.94	0.59
49. Innovation is deterred by the discovery of societal needs. (C7)	50	6	40	48	6	2.54	0.71
50. The organisation's innovations process is sufficient in leading to the development of new services. (C1)	50	4	44	50	2	2.50	0.61

51. The organisation's innovations process is sufficient in leading to the development of new products. (C1)	50	2	56	40	2	2.42	0.58
52. There are feedback systems between new technologies and the new market need. (C7)	50	2	48	48	2	2.50	0.58
53. Various departments contribute to innovation process. (C3)	50	8	22	66	4	2.66	0.69
54. Radical innovations has never put our organisation at risk of losing market share. (C1)	50	6	34	56	4	2.58	0.67
55. The innovation system of our organisation is quick at discovering, incubating and accelerating new innovations. (C4)	50	16	30	54	0	2.38	0.75
56. Cannibalization of products occur when new, better innovative ideas are in place.	50	6	46	48	0	2.42	0.61
57. Technological disruptions are the most important drivers of disruptive change.	50	4	38	52	6	2.60	0.67
58. Our organisation has identified a set of standard trends to help manage innovation.	50	10	32	58	0	2.48	0.68
59. Individuals recognize the value of new information in the organisation. (C5)	50	4	20	66	10	2.82	0.66
60. Groups recognize the value of new information in the organisation. (C5)	50	2	28	64	6	2.74	0.60
61. The institution recognized the value of new information in the organisation. (C5)	50	0	22	72	6	2.84	0.51
62. Accumulated experience improves the innovation of the organisation.	50	2	20	68	10	2.86	0.61
63. Factors that leads to change have been identified in our industry.	50	0	24	68	8	2.84	0.55

64. Sustainability is taken into consideration when identifying new trends.	50	2	16	74	8	2.88	0.56
65. We have a framework to audit our innovative capabilities of the whole institution. (C8)	50	2	38	54	6	2.64	0.63
66. There is an audit framework that focuses on each department specifically. (C8)	50	10	34	48	8	2.54	0.79
67. The organisation has sufficient resources supporting innovation.	50	16	50	30	4	2.22	0.76
68. We are familiar with our competitor's strategy. (C6)	50	12	34	50	4	2.46	0.76
69. We are familiar with our competitors' industry evolution. (C6)	50	8	34	54	4	2.54	0.71
70. The internal cultural environment in the organisation is conducive to innovation. (C2)	50	10	36	50	4	2.48	0.74
71. Management values the strategic importance of entrepreneurial initiative. (C2)	50	10	24	60	6	2.62	0.75
72. The organisation manages technology to its advantage. (C4)	50	6	28	58	8	2.68	0.71
73. Our technology management has a cross-discipline approach.	50	4	34	54	8	2.66	0.69
74. Our life cycles for products have shortened.	50	6	44	40	10	2.54	0.76
75. The organisations idea to market lead-time is flexible enough to react quickly to changes. (C4)	50	12	44	44	0	2.57	0.71
76. International competition has pushed our organisation to apply new effective technologies.	50	10	38	44	8	2.57	0.71

77. Customers drive internal decisions making. (C7)	50	8	42	46	4	2.56	0.72
78. Disruptive technologies are implemented without hindering existing customer relationships.	50	6	56	32	6	2.56	0.72
79. Customers have become co-creators of value to the organisations products and services. (C7)	50	6	46	44	4	2.56	0.72

Legend: C1: Construct 1- The innovation process leads to development of new products and services; C2: Construct 2- Internal entrepreneurship and innovation; C3: Construct 3- Change within internal processes are driven by innovation from various departments; C4: Construct 4- Innovation and technology management lead to competitive advantage; C5: Construct 5- Value of new information; C6: Construct 6- Familiarity with competitors strategy and industry evolution; C7: Construct 7 – Innovation is linked to customer feedback; C8: Construct 8- Innovation need to be measured.

The organisations involved do not have a strong influence from international counterparts and are sensitive but not mainly influenced by customers to drive internal decisions being made. There has been a relative extent to which disruptive technologies have influenced customer relations and there is some extent to which customer have become co-creators of value to the organisation.

Questions yielding the lowest mean (ẋ) values (below 2.5) for the respondents perception of the degree to which they agree with the statements on strategic management and foresight:

- Question 51: The organisation's innovations process is sufficient in leading to the development of new products. ẋ = 2.42 and S= 0.58
- Question 55: The innovation system of our organisation is quick at discovering, incubating and accelerating new innovations. ẋ = 2.38 and S= 0.75
- Question 56: Cannibalization of products occur when new, better innovative ideas are in place. ẋ = 2.42 and S= 0.61
- Question 58: Our organisation has identified a set of standard trends to help manage innovation. ẋ = 2.48 and S= 0.68
- Question 67: The organisation has sufficient resources supporting innovation. ẋ = 2.22 and S= 0.76
- Question 68: We are familiar with our competitor's strategy. ẋ = 2.46 and S= 0.76
- Question 70: The internal cultural environment in the organisation is conducive to innovation. ẋ = 2.48 and S= 0.74

From the data gathered and indicated above it can be seen that the organisations' innovation processes are inefficient and take too long to discover, incubate and accelerate new innovations. New products do not cannibalise current products which is contributed to the fact that they are merely updated. There is a need for identifying a set of standard trends to follow to manage innovation and there is a need for resources supporting innovation. The organisations are not familiar with their competitor's strategy and their internal cultural environment within the organisation is not conducive to innovation.

3.7.1.4 Assessment of questionnaire results Section E

Table 3.5 shows the results of how respondents viewed the way organisations of the future will view research perspectives in the Higher Academic Institutions. These results will be discussed below. Questions yielding the highest mean ($\dot{x}$) values (higher than 2.7) for the respondents perception of the degree to which they agree with the statements on future research perspectives:

- Question 85: Dominant logic hinders the acceptance of alternative developments. $\dot{x}$ = 2.70 and S= 0.65
- Question 93: The organisation operates in a fast technological changing environment. $\dot{x}$ = 2.84 and S= 0.77
- Question 95: Workshops are great for idea generation. $\dot{x}$ = 2.88 and S= 0.77
- Question 96: Idea generation helps the organisation build its internal knowledge. $\dot{x}$ = 2.94 and S= 0.55
- Question 97: The organisation has one or more vision of the future. $\dot{x}$ = 3.00 and S= 0.57
- Question 98: Images for the future is used to guide innovation within the organisation. $\dot{x}$ = 2.80 and S= 0.57
- Question 100: Workshops motivate me to share ideas. $\dot{x}$ = 2.80 and S= 0.81

From the responses it is clear that dominant logic is a hindrance to new developments that occur within a fast changing technological environment. To generate new ideas for these times, workshops are a great tool and help build the internal knowledge base of the organisation. Organisations also have more than one vision for the future which is used to guide the organisation.

Questions yielding the neutral mean ($\dot{x}$) values (ranging from between 2.5 and 2.7) for the respondents perception of the degree to which they agree with the statements on strategic management and foresight:

- Question 80: Governmental policies hinder our organisation's implementation of new technologies. $\dot{x}$ = 2.68 and S= 0.68
- Question 81: Government funding is made available for our organisation to implement new technologies. $\dot{x}$ = 2.50 and S= 0.74

- Question 82: The organisation has increased its stakeholder participation with the creation of new insight. $\dot{x}$ = 2.58 and S= 0.50
- Question 84: Our organisation focuses on exploring possible changes. $\dot{x}$ = 2.64 and S= 0.66
- Question 89: Experts and decision makers are involved in the foresight process. $\dot{x}$ = 2.66 and S= 0.66
- Question 94: The organisation constantly has to update its strategy due to the speed of innovation. $\dot{x}$ = 2.64 and S= 0.72
- Question 99: There is a clear transition path from the present to the future. $\dot{x}$ = 2.56 and S= 0.71

Participants had indicated that there is some disturbance from implementing new technologies from government policies and a limited amount of government funding is made available for the implementation of new technologies. Stakeholder participation needs to be increased along with the need for the organisation to focus more possible changes. Experts and decision makers have to become involved with the foresight process to help create a clearer transition path to the future. Participants also indicated that their organisations do not constantly adjust their strategies according to the speed of their innovation.

Questions yielding the lowest mean ($\dot{x}$) values (below 2.5) for the respondents perception of the degree to which they agree with the statements on strategic management and foresight:

- Question 86: Everyone in the organisation is encouraged to participate in foresight activities. $\dot{x}$ = 2.22 and S= 0.79
- Question 87: Actors and boundary spanners are used to gather external information into the organisation. $\dot{x}$ = 2.30 and S= 0.71
- Question 88: Staff has the adequate ability to identify trends. $\dot{x}$ = 2.44 and S= 0.68
- Question 92: Our products and services have shortened lifecycles. $\dot{x}$ = 2.44 and S= 0.72

The results above show that there is not an all-inclusive approach to get everyone to participate in foresight activities and that there are no actors or boundary spanners used to gather external information. Participants have also indicated that staff doesn't have the necessary abilities to identify trends.

Question 90 tested which methods of future studies the participants used in their organisation. From the results 34% indicated they used scenario analysis, 18% used Technology forecasting, 24% used Road mapping, 4% used Back casting, 10% used mathematical models while 10% selected the other option. The 10% other consisted of respondents not knowing the answer, the use of effectual logic and lastly systemic systems thinking.

Table 3.5: Future Research perspectives

Statements	Number of participants	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Standard Deviation
80. Governmental policies hinder our organisation's implementation of new technologies.	50	0	44	44	12	2.68	0.68
81. Government funding is made available for our organisation to implement new technologies.	50	12	28	58	2	2.50	0.74
82. The organisation has increased its stakeholder participation with the creation of new insight.	50	0	42	58	0	2.58	0.50
83. Our aim is to predict changes.	50	10	34	58	0	2.46	0.68
84. Our organisation focuses on exploring possible changes.	50	8	22	68	2	2.64	0.66
85. Dominant logic hinders the acceptance of alternative developments.	50	2	34	56	8	2.70	0.65
86. Everyone in the organisation is encouraged to participate in foresight activities. (C1)	50	22	34	44	0	2.22	0.79
87. Actors and boundary spanners are used to gather external information into the organisation.(C1)	50	14	42	44	0	2.30	0.71

88. Staff has the adequate ability to identify trends.	50	8	46	40	6	2.44	0.73
89. Experts and decision makers are involved in the foresight process. (C1)	50	6	26	64	4	2.66	0.66
92. Our products and services have shortened lifecycles. (C2)	50	4	54	36	4	2.44	0.68
93. The organisation operates in a fast technological changing environment. (C3)	50	6	20	58	16	2.84	0.77
94. The organisation constantly has to update its strategy due to the speed of innovation. (C3)	50	8	26	60	6	2.64	0.72
95. Workshops are great for idea generation. (C4)	50	8	12	64	16	2.88	0.77
96. Idea generation helps the organisation build its internal knowledge.	50	4	6	82	8	2.94	0.55
97. The organisation has one or more vision of the future. (C5)	50	2	10	74	14	3.00	0.57
98. Images for the future is used to guide innovation within the organisation. (C5)	50	0	28	64	8	2.80	0.57
99. There is a clear transition path from the present to the future. (C5)	50	6	38	50	6	2.56	0.77
100. Workshops motivate me to share ideas. (C4)	50	10	14	62	14	2.80	0.81

Legend: C1: Construct 1 – Participation in foresight; C2: Construct 2- Product Lifecycle; C3: Construct 3- Operating in a fast changing environment; C4: Construct 4- Workshops improve idea generation and sharing; C5: Construct 5- Future vision guided by innovation with a clear path.

3.8 RELIABILITY ANALYSIS: CRONBACH'S ALPHA COEFFICIENT

The internal consistency or reliability of a test was first calculated by calculating the alpha coefficient as proposed by Lee Cronbach (Cronbach, 1951:297). The Cronbach alpha test is used to test reliability and the most commonly used measure for a set of two or more construct indicators. An indicator is a single variable used in conjunction with one or more other variables to form a composite measure or factor (Hair *et al.*, 1995:1).

Cronbach's alpha as a measure splits the data in to all the possible ways and then calculates the correlation coefficient for each split and thus becomes the average of these values. The use of Cronbach alpha as a test for reliability is suitable for use with questionnaires that make use of Likert scale's (Field, 2009:675).

Cronbach alpha coefficient is stated to be the numerical value that lies between 0 and 1, and as described the extent to which items that measure the same construct is inter-related (Tavokol & Dennick, 2011:53). A generally accepted value for Cronbach's alpha is greater than 0.8 for cognitive tests while the values greater than 0.7 are suitable for ability tests. With testing psychological constructs being measured even lower levels can be realistically accepted (Field, 2009:675). It was found that the length of the test has an impact on the values produces as seen where shorter tests produce lower values (Tavokol & Dennick, 2011:53).The Equation 3.2 show Cronbach alpha is calculated.

Equation 3.2: Cronbach's alpha coefficient

$$\alpha = \frac{k}{k-1}\left[1 - \frac{\sum_1^k \sigma_{Y_i}^2}{\sigma_x^2}\right]$$

Where:

α= Cronbach's alpha coefficient

k= number of items in the construct

$\sigma \frac{2}{y_1}$ = variance of item, *i*, where = 1 to *k*

$\sigma \frac{2}{x}$ = variance of the observed total item scores

In this study, Cronbach's alpha coefficient was used to determine the internal reliability of the dimensions in each construct and was conducted to test and validate the structures. The results for reliability of the constructs are tabled in Table 3.6.

Table 3.6: Constructs

Constructs	Cronbach's alpha	Cronbach's alpha based on standardised items	No of items
Foresight factors and styles			
1. New technologies and trend identification	0.651	0.658	2
2. Adoption of new technology and trends	0.842	0.847	2
3. Acceptance of new technologies and trends	0.718	0.734	3
4. Systematic foresight used to build value networks	0.905	.905	2
Strategic management and Foresight			
5. Sensitivity to operating environment	0.816	.0818	2
6. Company drives the market– Company drives the market	0.737	0.737	3
7. Strategic planning is multi-disciplinary and all inclusive	0.779	0.798	2

Innovation management			
8. The innovation process leads to development of new products and services	0.754	0.759	4
9. Internal entrepreneurship and innovation	0.832	0.836	3
10. Change within internal processes are driven by innovation from various departments	0.754	0.755	2
11. Innovation and technology management lead to competitive advantage	0.788	0.789	4
12. Value of new information	0.782	0.778	3
13. Familiarity with competitor's strategy and industry evolution.	0.922	0.923	2
14. Innovation is linked to customer feedback	0.646	0.645	5
15. Innovation needs to be measured.	0.675	0.686	2
Future research			
16. Participation in foresight	0.679	0.680	3
17. Product Lifecycle	0.833	0.837	2

18. Operating in a fast changing environment	0.685	0.686	2
19. Workshops improve idea generation and sharing;	0.785	0.786	2
20. Future vision guided by innovation with a clear path.	0.827	0.833	3

The overall Cronbach's alpha coefficient for the majority of the constructs within the questionnaire exceeded 0.7 which deems the instrument reliable. The lowest value obtained as 0.646 which is still acceptable for internal consistency reliability in the questionnaire due to the diversity of the constructs being measured. The highest Cronbach's alpha obtained was 0.922.

It can be concluded that the questionnaire measuring the use of foresight as a managerial skill to manage business decisions in Higher Academic Institutions is consistent in what it is intended on measuring. Even though some correlations had only two Cronbach Alpha's and may been seen as too few for a true reflection, these can be used to identify areas for further research in the field.

3.9 CORRELATIONS AND RELATIONSHIPS

Whilst evaluating Table 3.6 which lists all the constructs and their Cronbach alpha values, the following constructs will be discussed according to their constituting factors.

3.9.1 Section B discussion

The first construct consisted of question 10 and 12 from section B. Question 10 asked whether they were focussed on following the development of new technologies while question 12 focussed on whether new trends are identified early on. These questions both focussed on new technologies and trend identification. Both scored high mean values 3.08 and 2.72 and when the results for agree and strongly agree of question 10 were combined were 88% and question 12 with a combined value of 68% agree

and strongly agree indication. For businesses' to survive in the faster and ever changing business environment they have to be able to identify these new trends and technologies earlier.

The second construct consisted of question 11 and question 13. Question 11 asked whether the application of new technologies within the institutions is adopted quickly and question 13 asked whether new trends are adopted quickly into the organisation. This construct focussed on the adoption of trends and technologies and the questions scored average means of 2.54 and 2.46.

The third construct consisted of questions 14, 15 and 16. They were:

- 14. New trends have a major impact on how we operate within our business environment.
- 15. The use of new technology is welcomed by personnel.
- 16. New trends are accepted easily by personnel.

These questions scored mean values of 2.90, 2.72 and 2.48 where question 16 had the most neutral split in respondent's answers. This construct revolved around the acceptance of new technologies and trends.

The fourth construct consisted of question 18 and 19 which focused on how systematic foresight was used to build value added networks. Question 18 is mentioned in the previous paragraph and question 19 as whether they created value added networks with the use of foresight. Reponses generated mean values of 2.44 and 2.38 which indicate that respondents' organisations did not use foresight for the purpose of building value added networks very effectively.

3.9.2 Section C Discussion

The fifth construct consists of question 26 and question 27 where the construct focused on sensitivity to the environment. Question 26 asked whether environmental scanning is incorporated in strategic planning sessions and question 27 whether strategies are adjusted to accommodate environmental changes. The questions had means of 2.90 and 2.88 which shows that the organisation has to accommodate environmental scanning as a part of its strategic planning.

The sixth construct focussed on whether companies were driving their markets. It consisted of question 28 which asked if theirs companies has the capacity to actively develop external elements and question 29 if their organisation is pushing the environment to be more in our favour. The means values were 2.66 and 2.62 which indicates that there was some degree to how they drove the market but that they were not the market leaders.

The seventh construct consists of three questions which are:

- 34. Multi-disciplinary perspectives are taken into consideration with strategic planning.
- 35. Strategic planning is participatory with lower levels.
- 39. Resources cognition is applied to support new strategies.

The focus of the construct was is on how strategic planning is multi-disciplinary and all inclusive. Means from the results were 2.90, 2.36 and 2.58 which illustrates that strategic planning has to become more inclusive.

3.9.3 Section D Discussion

The eight construct consisted of questions 44, 50, 51 and 54 with the focus on how the innovation process leads to the development of new products and services. The questions were:

- 44. Innovation within the organisation has continually led to new products and/or services being designed.
- 50. The organisation’s innovations process is sufficient in leading to the development of new services.
- 51. The organisation’s innovations process is sufficient in leading to the development of new products.
- 54. Radical innovations have never put our organisation at risk of losing market share.

These questions had mean values of 2.67, 2.50, 2.42 and 2.58. From this it is clear that the organisation has to improve innovation of new services and products to avoid losing market share.

The ninth construct consisted of questions 43, 70 and 71 with its focus on internal entrepreneurship and innovation. The questions were:

- 43. Internal entrepreneurship is encouraged.
- 70. The internal cultural environment in the organisation is conducive to innovation.
- 71. Management values the strategic importance of entrepreneurial initiative.

Responses for these questions generated means of 2.66, 2.48 and 2.62. Organisations encourage internal entrepreneurship but needs to focus on getting the internal cultural environment to be more conducive to innovation.

The tenth construct consisted of questions 45 and 53 with the focus on change within internal processes being driven by innovation from various departments. Questions 45 asked whether innovation is a driver for change in internal processes and question 53 asked whether various departments contribute to innovation process. Their means were 2.74 and 2.66 which indicated that these organisations changes are driven from the innovation within the organisation.

The eleventh construct consisted of question 46, 55, 72 and 75 with the focus on how innovation and technology management leads to a competitive advantage. The questions were:

- 46. Innovation within our organisation has given us the competitive advantage over our competition.
- 55. The innovation system of our organisation is quick at discovering, incubating and accelerating new innovations.
- 72. The organisation manages technology to its advantage.
- 75. The organisations idea to market lead-time is flexible enough to react quickly to changes.

The questions had means of 2.80, 2.38, 2.68 and 2.57. Innovation leads to a competitive advantage but the organisations have difficulty at discovering, accelerating and incubating new innovations quickly.

The twelfth construct consists of question 59, 60 and 61 and focused on the value of new information. The questions were:

- 59. Individuals recognize the value of new information in the organisation.
- 60. Groups recognize the value of new information in the organisation.
- 61. The institution recognized the value of new information in the organisation.

The questions had means of 2.82, 2.74 and 2.84. This indicated that the value of new information has to be recognized throughout the whole organisation.

The thirteenth construct consists of question 68 and 69 with its focus on the familiarity with competitor's strategy and industry evolution. Question 68 asked whether they were familiar with our competitor's strategy and question 69 whether they are familiar with our competitors' industry evolution. These questions had mean values of 2.46 and 2.54 which are on the low side indicating that the organisations do not have a very good idea of their competitors strategy and industry evolution.

The fourteenth construct consisted of question 48,49,52,77 and 79 with its focus on innovation being linked to customer feedback. The questions were.

- 48. Innovation is driven by the discovery of market needs.
- 49. Innovation is deterred by the discovery of societal needs.
- 52. There are feedback systems between new technologies and the new market need.
- 77. Customers drive internal decision-making.
- 79. Customers have become co-creators of value to the organisations' products and services.

The questions generated means of 2.94, 2.54, 2.50, 2.56 and 2.56. This indicated that innovation is driven by the market and that the organisations can become more in touch with societal needs.

The fifteenth construct consisted of question 65 and 66 with its focus on innovation that needs to be measured. The questions were:

- 65. We have a framework to audit our innovative capabilities of the whole institution.
- 66. There is an audit framework that focuses on each department specifically.

The means for these questions are 2.64 and 2.54 which indicates that organisations have to improve on the audit frameworks they have for both the whole institution and each department.

3.9.4 Section E Discussion

The sixteenth construct consists of question 86, 87 and 89. These questions are:

- 86. Everyone in the organisation is encouraged to participate in foresight activities.
- 87. Actors and boundary spanners are used to gather external information into the organisation.
- 89. Experts and decision makers are involved in the foresight process.

The means were 2.22, 2.30 and 2.66 with the focus on participation in foresight. This indicates that the organisations do not receive inputs from everyone and that there are no specific role-players within the organisation that gather external information.

The seventeenth construct consists of question 74 and 92 and focuses on product life cycle. Both the questions asked whether their products and services have shortened lifecycles. They got mean values of 2.54 and 2.44 which indicate that their products are not being updated regularly but rather that they are lagging behind the current trends in their operating environment.

The eighteenth construct consists of question 93 and 94 with its focus on operating within a fast changing environment. Question 93 asked if the organisation operates in a fast technological changing environment and question 94 asked whether the organisation constantly has to update its strategy due to the speed of innovation. The mean values were 2.84 and 2.64 which leads to conclude that these organisations operate in fast changing environments but due to their size it takes time to implement new technologies and trends.

The nineteenth construct consists of questions 95 and 100 with its focus being that workshops improve idea generation and sharing. The question for 95 was whether workshops are great for idea generation and question 100 whether workshops motivated respondents to share ideas. They had means of 2.88 and 2.80 which

confirms that workshops within the organisation improves idea generation and motivates respondents to share ideas.

The twentieth construct consists of question 97, 98 and 99 with its focus on future vision being guided by innovation with a clear path. The questions were:

- 97. The organisation has one or more vision of the future.
- 98. Images for the future are used to guide innovation within the organisation.
- 99. There is a clear transition path from the present to the future.

The mean values from the questions were 3.00, 2.80 and 2.56. This indicates that the organisation has more than one vision but needs to improve how they translate the path to achieving the visions.

3.9.5 Relationship between constructs

From the above analysis of the constructs discussion it is evident that the data depicts a picture that is similar to the technology adoption life cycle developed by Moore. The model explains that there is a chasm that exist between the points where technology gets accepted in the early market and where the buyers are pragmatists in pain. The relationship lies within the way respondents showed that they relate to the Flexist foresight personality which is eager to try new technologies and innovation, but remains sceptic about and hesitate to adopt the new ideas.

The data also showed that participants agreed to the fact that dominant logic hinders the acceptance of alternative developments which is consistent to the behaviour of the pragmatist who is stuck in pain. This phase specifically focuses on how there is a business process problem and there is willingness to take a chance on something new, provided it will directly solve their specific case.

In relation to this it is also seen that how in the tornado phase where buyers are pragmatists going to the herd and the technology now being proven as valuable and superior to the status quo, with the forcing being the fear of getting left behind. This is supported by the way the participants expressed that they are reluctant to adopt new trends easily as well as construct supporting the theory.

To further support the relationship, the respondents have shown that their relation to foresight personalities that the majority related to Flexist personality, followed by the Activist personality, then the Futurist and after the Futurist they associated with the Opportunist. The significance of this is that the Flexist can be divided into two types, the first being eager to adopt the new technology, innovation and ideas when presented and becoming interested. The second type is the one whom only adopt these innovations and ideas after they have been tested by others. The application of this is relevant since the first type will be falling directly after the chasm and the latter further up the life cycle.

The application of this concept explains why the organisation does not have sufficient innovation and internal entrepreneurial activities. The organisation does not foster these environments nor do they create the opportunities for Futurists and Activists to be able to flourish and thrive in a culture where they are free to take risks without the fear of failing. The needed resources for these cultures also have to be made available for them to explore new innovations and technologies.

In the constructs it was found that companies had to become more aware of their environment and have to become more inclusive in how they approach decisions regarding their strategic planning. The organisations were also not depicted as market drivers, thus concluding that this could be contributed by the lack of foresight personalities that could contribute to the development of new ideas and innovation. This also explains why the majority of respondents associated with the early adaptors and early majority from the technology adoption life cycle.

3.10 QUALITATIVE ANALYSIS

Open-ended questions were used to qualitatively analyse two aspects of the respondents' view of the industry. The first focused on what respondents perceive as the critical trends for their organisation and secondly they were asked what they would consider as the next big thing for their industry.

The first question asked respondents to give the trend they think is critical to their organisation. The responses generated the list of the following trends:

- Elaboration with Universities of technologies to offer level 5, 6 and 7 National Certificate Vocational programmes.
- A shift from long-term studies to shorter programmes like 1-year learner- ships.
- The impact of technology and E-learning. Increase the use of internet to offer programmes through distance learning.
- Loss of organisational knowledge due to quick staff turnover.
- Increase demand for relevant academic and professional courses. Programmes need to adapt quicker to the external requirements with the relevant up to date equipment and machines.
- Better change management and implementation of new technologies.
- Utilizing open source software and Big Data.
- Start utilizing smart handheld devices for open learning.
- Reduced fees for Higher Education Institutions without losing competitiveness.
- Improved methods to improve student participation and knowledge.
- Succession plans.
- Self-help for students through information technology methods. These methods should address the needs and preferences of students.
- Research and knowledge production to become more competitive internationally.
- More inclusive decision process.
- Inter-professional learning ensuring staff is at the front of their occupational field of expertise.
- Universities becoming for-profit organisations being less reliant on state funding.
- Quality of education.

It is clear from the above trends being identified by respondents that there are a select few to implement within Higher Academic Institutions. As per example, courses need to become more in touch with the relevant and most recent developments in their field. The method of learning delivery needs to adapt to the societal needs and perceptions of the target market. The need for these organisations to align their course content with relevant industry developments and focus on designing a delivery system that will address the needs of the markets in which they operate can be further researched.

There was stronger relation indicated by participant with regards to starting to utilise more e-based learning that is more in line with modern and updated trends in their fields. A strong focus has also been seen with regards to better collaboration between industries and educational providers. Although it is a small convenience sample there is still some truth to the findings which can be researched further.

The following responses were generated when the respondents were asked what they see as the next big thing for their industry:

- Electronic learning material replacing textbooks and electronic based assessments.
- Distance education.
- Better networking between private higher education institutions.
- New functional product development.
- Basic business principles and practices being reinvented.
- Knowledge creation in multi-disciplinary areas with academic partners and industry.
- Improved connections between smart devices.
- Providing cost effective distance learning to off-campus students.
- Better collaboration between research and innovation.
- Paperless meetings
- Internet learning, free online courses.
- SETA Involvement
- More focussed research to deal with critical issues such as epidemics, poverty and climate change.
- More inclusive management systems in organisations.
- Co-creation of goals for organisations.
- Development of critical thinking groups via peer and technological collaboration.
- Utilization of Big Data and information security along with cloud technology.
- More international collaboration.
- Each organisation has to become a focused organisation regarding their primary courses offered.

From the respondents responses there is a clear and definite indication that Higher Academic Institutions need to develop better distance learning programmes making better usage of the internet and smart devices. It has also come to show that there is an open learning environment that could be developed with better collaboration between organisations. This could effectively increase the bases of knowledge and improve quality to become more competitive in the international market. Further research can be conducted on these findings considering the sample size.

3.11 CONCLUSION

It is evident from the results in section B that even though organisations follow trends and is aware of the new technologies available and utilizes it to create new technologies for the organisation, that there is still a very big hindrance to the adoption of these technologies. The organisation lacks systematic ways to gather data utilizing foresight which explains why these new trends are difficult to implement along with staff members reaction and adoption of new trends and technologies.

With the evaluation of personality styles, the strongest foresight style was that of the Flexist. These individuals are not those who seek and find new trends, but they test and adopt them either when introduced or after carefully evaluating the new idea. It was also found that participants had associated strongly with the Activist and Futurist styles which are personalities that seek new innovation and ideas.

In section C it can be seen that organisations needs to engage in more environmental interactive activities to ensure that they accommodate the external changes and help build better networks along with co-created goals with other businesses. This can be improved by the way managers become more sensitive to what's happening in their business environment and help create a more favourable environment. This could be done by using internal entrepreneurial activates, evaluating alternative futures, roadmaps, scenarios and evaluating real options.

These new strategies should then be supported by the needed resources to help the company invest in gaining the competitive advantage standing to be gained. It is important that these organisations need to develop methods of inviting more participation from lower levels. This will help in empowering employees to be more

open to change within in the organisation and allow them to have stronger dynamic capabilities.

From section D it is clear that innovation leads to new products and service within the organisations since it has been indicated as a driver for change which contributes to gaining a competitive advantage. Discovery of market needs, the value of new knowledge within the organisation and cumulative experience is shown to have improved innovation. Organisations need to improve their internal entrepreneurship and have to develop a way to get better feedback from their market.

Radical innovations can cause these institutions to lose market share if they neglect to improve their innovative capabilities. These organisations have to become more in touch with their environment and the new trend in order to be informed about their competition and how their products need to be adjusted to better serve the market. Organisations have to become more effective with how their innovative processes function to improve discovery, incubation and the acceleration of new innovations. The major trends within the industry need to be identified to help manage innovation along with allocating the necessary resources.

From section E it is evident that dominant logic is prevalent to hindering progression in the changing environment and that workshops are good for building internal knowledge. Even though government supplies a certain amount of funding they are also hindering the implication of new technologies. Participation should be increased from stakeholders, experts and decision makers when adjusting strategic goals which are currently not happening on a regular basis due to the lack of innovation.

The qualitative data had shown that there are three main trends that are prevalent and needs to be focused on. Courses need to become more relevant and adapted more frequently to what is related within the industry. The methods implemented has to evolve to become more adjusted to that of the current and future needs of society including the use of smart devices as a basic prerequisite for programs. Finally an open learning community needs to be created where better collaboration between organisations could be gained that will effectively increase the knowledge availability to one another.

3.12 CHAPTER SUMMARY

This chapter focused on the research methodology and findings of the empirical study. The procedures and scope of the quantitative as well as the qualitative research conducted in the study, including the sample size and survey instrument, which consisted of a questionnaire, which had all been discussed.

There was an analysis of the demographical profile of the respondents along with the frequency analysis, descriptive statistics, reliability and the internal consistency not neglecting the constructs between the selected constructs and questions that were tested using the SPSS software package. The use of foresight as managerial skill in higher academic institutions and the various factors impacting foresight were reported on and analysed along with the reliability and internal consistency of the constructs. The last section of the quantitative analysis was the correlations and relationship amongst the constructs that were discussed at the hand of the literature review from Chapter 2.

Finally the qualitative section open-ended questions were analysed and reported on.

CHAPTER 4

CONCLUSIONS, LIMITATION, FORESIGHT FORMULA AND RECOMMENDATIONS

4.1 INTRODUCTION

The focus of this chapter is to draw the conclusions on the basis from the literature review in Chapter 2 and the results of the empirical study found in Chapter 3. The literature review on the concepts underpinning foresight as a critical skill for managing business decisions and the results from the empirical research performed in this study will enable the researcher to draw conclusions.

Limitations related to the research literature review and empirical investigation will be explained in the context of the conclusions drawn from the research. A possible formula for foresight as critical skill will be discussed and explained. The recommendations for further research for the Higher Academic Institutions that participated in the empirical research will be discussed.

4.2 CORRELATIONS BETWEEN LITERATURE AND RESULTS

Conclusion will be drawn about the assessment of foresight as a managerial skill to manage business decisions within higher academic institutions with specific reference to the contextual framework of the research and literature reviewed.

4.2.1 Conclusion on foresight factors and styles.

It was found in the results that institutions were focussing on the development of new technologies which is consistent with the literature considering that as a factor of foresight since one of its characteristics is being action orientated. It was indicated that these new trends have an impact on the institutes which agrees with the modern organisation having to become pro-active and path breaking. The institutions utilize these new trends to help develop new technologies which are a result from foresight considering that it requires these institutions to scan their environments and the upcoming trends.

From literature it was seen that foresight is governed by three factors, where these factors are that institutions should focus on building knowledge, networks and building participation and action. The data indicated that institutions have not been able to build the necessary networks and lacked the capacity to build the internal knowledge base along with the creation of better participation and action from staff members. The fact that staff members are not open to the adoption new technologies relates to a possible factor that they are not eased into the changes brought into the institute due to the lack of participation in foresight.

The responses showed that these institutes lack a systematic design process which utilizes foresight that is confirmed by the literature that explains that when the abovementioned factors are not taken into consideration the process becomes non-systematic and incoherent. The results also indicated that these institutions view change as an unnecessary event which stand in direct contrast to developing dynamic capabilities which are required to survive in the changing business environment.

From the literature there were six foresight styles identified. In the population the strongest relation was found to that of the Flexist personality which hesitates to adopt new trends and technology quickly, but rather wait till it has been proven. In this personality group there is also a division which waits till the last moment to adopt new technology only for the sake of not being left behind. This once again is perfectly depicted by the technology adoption lifecycle where new technologies have to cross the chasm between the early adopters and the pragmatic users that wait till it is proven before they respond.

4.2.2 Conclusion on strategic management and foresight

From the data institutions do use tools like industry analysis, environmental scanning and adjust their strategies accordingly which is consistent with the literature but the data indicated that there could be an improvement on this aspect of the institutions. This enables them to understand their environments along with their present resources and their own weaknesses. These institutions prefer avoiding prediction and instead focus on responding to changes as they emerge thus emphasising continuous experimentation and fast adaption to its changing environments.

The data has shown that these institutions are using a transformative approach which is supported by the fact that they have co-created goals with other business in their

ecosystem and mutually supportive processes where their actions precede clear and predictable outcomes. The data also indicated that these institutions needed to develop the capacity to develop external elements to control and create their operating environment. This will allow them to develop characteristics they seek and is more focused on insightful and entrepreneurial actions.

The options used for investigations by the institution according to the responses are as follows ranking from most used to least:

- Real options;
- Scenarios; and
- Roadmaps.

The explanation for the lack of dynamic capabilities lies within the size of the institutes which are subjective to the macroeconomic environment where it is difficult to control the environment and they are beyond the control or any influence from any major industry players. The larger the institution the greater difficulty they will experience in developing dynamic abilities and find it harder to change and tools like real options and scenarios are very valuable for systematic collecting, processing and organising knowledge of future events.

The institutions' resources are unique to each institution and determine their competitive advantage and as data show they have to focus more on allocating resources to support new strategies thus improving their dynamic abilities. They need to make foresight a part of their formal strategic planning as the use of this supports four processes which increases the firm's evolutionary fitness. These four processes are searching for new resources, deciding which should be adopted, configuration and deployment and implementation.

4.2.3 Conclusion on Innovation management

In relation to literature respondents have indicated that innovation has continually led to new products and/or services being designed. Innovation has also been depicted as a driver of internal change and helped the institutions gain a competitive advantage. Corresponding to the literature review innovation is driven by technological knowledge along with the discovery of market needs which relate to the innovation in systems and networks. These systems and networks refer to innovation processes which are

distributed among different organisations that contribute to the innovation process with complementary assets.

Radical innovation is lacking from these institution as the respondents had reacted with a low mean value where if they were they would be able to quickly discover, incubate and accelerate innovation. The responses also had a low response to the cannibalisation of their current products which is necessary to develop new products. Respondents have a partially agreed that technological disruptions are the most important drivers of disruptive change which can be contributed to the fact that the institutions are not focussed on being the market leaders but rather wait to adopt new technologies once they have been proven.

In terms of the institutions absorptive capacity which relates to how the institution pertains to knowledge creation, learning capacity, environmental scanning and the absorption of new ideas there is a need to improve in these aspects. Radical innovations have put the institution at risk before and there needs to be a better feedback system developed that corresponds to how literature shows that the customers are playing a larger part in which products and services they develop.

As seen in previous chapters the institutions are not leading their markets and as can be expected they have a partial idea of their competitor's industry evolution and tends to follow after other more active leading institutions. A stronger cross-disciplined approach can be considered to improve the innovation where they need to focus on gaining more knowledge and participation form the institutions employees which can shorten the idea to market lead time as this will decrease the resistance to change from within.

The impact of managing technology along with innovation effectively can be seen in the way that these institutions competitiveness is affected by the way international competition demands that they maximise competitiveness by maximising effective application of new technologies. The institutions from the study have to improve their effectiveness in the application of new technologies along getting more information from customer to incorporate in their decision-making processes.

4.2.4 Conclusion on Future Research perspectives

These institutions operate within a state regulatory framework which impacts how they operate. There was a positive correlation to the impact that stakeholders have in the creation of insight for the institutions and the impact that government has in the available resources. The regulation from government and the limitation of resources make it difficult to allocate sufficient resources to the needed areas for effective innovation to take place.

As the innovation process evolved to include the market perspective and later networking the institutions have also adapted in a cautious way to this considering that there is improvement for getting better feedback from the market. Dominant logic also seems to be hindering the acknowledgement of change and the acceptance of alternative development paths.

There is a lack of boundary spanners and involved actors which assist with the transportation of external knowledge into the institution. This has a negative impact considering that this is needed to become more innovative and gain a better understanding of the external environment in which they operate. Workshops which are a key instrument for open innovation is a tool used by the institution but they can improve the range of employees chosen to participate as there needs to be more participation in the foresight process.

In the research the most used methods for future studies in the institutions were from most used to least, scenario analysis, road mapping, technological forecasting, mathematical models, back casting and systemic/systems thinking.

4.3 CONCLUSION ON SECONDARY RESEARCH OBJECTIVES

Conclusion about the assessing the use of foresight as a managerial skill to manage business decisions in Higher Academic Institutions will be made with specific reference to the contextual framework of the research and literature reviewed.

4.3.1 Research Objective 1: Determine the factors on which foresight is dependent.

From the literature it was seen that there are three major groups on which foresight factors are dependent which are strategic management, innovation management and

future research. In the research investigation there were sub fields influencing strategic management and they were:

- techniques used for strategic planning such as roadmaps, scenarios, real options
- Industry economic features
- Resource cognition
- Big Data applications increasing the effective use of institutional data
- Dynamic capabilities

The innovation management consisted of the following subfields:

- Radical innovation
- Disruptions
- Innovation capabilities audit framework
- Managing technology

The last aspect of future research perspectives consisted of the following:

- National economy perspective
- Corporate perspective
- Futures research and innovation management

4.3.2 Research Objective 2: Identify the skills that have an impact on the development of foresight.

From the literature it was found that the important skills that influence the development of foresight are found in two foresight personalities:

- **Futurist**

This style has two sides. The first side distinguishes between trends and fads due to their knowledge of history along with social patterns and their focus is more on thinking about 5 to 20 years or more. They understand that trends have both a positive and negative character but are neutral observers of what is happening in the environment around them. The second side focuses on putting forth messages that communities, politicians and companies need to hear, with the content informing them of possible

consequences of behaviour and what might be expected in the future. They always try to look for perspective, trying to see the whole picture.

- **Activist**

They focus on creating measures that ensures the best future is realised and gain insight from futurists and spread them. They are motivated by a strong commitment to what they do and determine a course of action that they are committed to whilst expecting to be equally enthusiastic. They introduce new ideas and innovation into the system or fight the implementation of a new system.

4.3.3 Research Objective 3: Understand current methods currently used to implement foresight in the business environment.

There current foresight process in Figure 6 consists of the following steps:

- Preparation;
- Identification or scanning;
- Data collection;
- Filtering, analysing and interpretation;
- Decision-making; and
- Implementation.

4.3.4 Research Objective 4: Determine which skills are critical to the successful use of foresight in an organisation.

From the literature the following skills which has a direct impact on the successful use of foresight within the organisation was identified:

- Being able to identify new trends and technologies and the benefits they have for the institution.
- Communicating the vision of the application of the new idea to the rest of the institution to get the maximum response to adopt the ideas.
- Getting all inclusive participation from the employees at the institution.
- Being open to change and new innovative concepts, ideas and technologies.

4.3.5 Research Objective 5: Understand the relationship that technology has on the use of foresight as a skill.

From the research it was found in the concept of the technology adoption life cycle has a strong relation to the way technology impact the use of foresight as a skill. Considering the fact that foresight revolves around the basis of identifying new trends, fostering innovation and adopting new technologies into the institutions it is clear to see the relationship when analysing the data where the respondents have shown that they are not early to adopt new technology thus making them sceptical and less effective to be successful at using foresight as skill.

From the literature it was found that the early adopters of new technologies are those personalities that bring new ideas into the institution and foster new innovations. They are also the ones who introduce new ideas and technology within the institution.

4.4 CONCLUSION ON PRIMARY OBJECTIVE

The primary research objective was to do an assessment of the use of foresight as a managerial skill to manage business decisions in Higher Academic Institutions. The objective was realised in chapters 2 and 3. The factors that influence foresight as a skill are embedded within the four factors that consist of foresight styles, strategic management, innovation management and future research. The construct have illustrated to be focused on various aspects of foresight and shows to have causal relationships.

4.5 LIMITATIONS

Limitation faced during the study regarding the literature review and empirical research will be discussed below.

4.5.1 Limitations of the literature review

Literature relating to foresight as managerial skill in Higher Academic Institutions in South Africa has not been published and there is no work done in this field on the topic. The amount of research on the topic of foresight was sufficient to write the literature review.

4.5.2 Limitations of the empirical research

The first limitation is related to the empirical research and the fact that there is no questionnaire that has been developed to assess the use of foresight as a managerial skill in Higher Academic Institutions. A new questionnaire had to be designed and developed based on the findings of the literature review.

The second limitation is that the questionnaire is subject to the perception of the participants. Therefore it was critical in the questionnaire to create the right mind-set before answering the questions and this has been as serious handicap to the study. Sample size conditions have also impacted the research considering the nature of the working environments of the individuals that participated in the study.

4.6 FORMULATION OF A POSSIBLE FORESIGHT CRITICAL SKILL FORMULA

From the empirical research conducted in Chapter 3 there were 20 constructs identified that are industry related within the Higher Academic Institution. These constructs are sub factors of four key elements that could be formulated to create a formula that would be used to do an analysis on where the shortcomings are within in an organisation and then the result to plot how effective you are in comparison to other organisations with relation to the use of foresight.

The proposed four elements are Foresight factors, Strategic management, Innovation management and Future based research. These could be formulated as follows:

Foresight Skill = Foresight Factors x Strategic Management x Innovation management x Future Based Research.

The list of construct is described in chapter 3.8 where their validity are discussed and shown with the Cronbach alpha values. The questions are measured on a Likert scale with four options (Strongly Disagree, Disagree, Agree, and Strongly Agree) thus there can never be a 0 answer. This is critical in the formula since multiplying with a 0 would give a 0 result and this would indicate that the organisation has no foresight skills at all. The problem with this is that all organisations have a measure of foresight skills that varies but could never be 0. The elements with their constructs are as follow:

- **Foresight Factors**
    1. New technologies and trend identification

2. Adoption of new technology and trends
3. Acceptance of new technologies and trends
4. Systematic foresight used to build value networks

- **Strategic management**

  5. Sensitivity to operating environment
  6. Company drives the market – Company drives the market
  7. Strategic planning is multi-disciplinary and all inclusive

- **Innovation management**

  8. The innovation process leads to development of new products and services
  9. Internal entrepreneurship and innovation
  10. Change within internal processes are driven by innovation from various departments
  11. Innovation and technology management lead to competitive advantage
  12. Value of new information
  13. Familiarity with competitor's strategy and industry evolution.
  14. Innovation is linked to customer feedback
  15. Innovation needs to be measured.

- **Future Based Research**

  16. Participation in foresight
  17. Product Lifecycle
  18. Operating in a fast changing environment
  19. Workshops improve idea generation and sharing;
  20. Future vision guided by innovation with a clear path.

The calculation for the value of each element works as follows. First the value for each construct needs to be calculated. Each construct consists of two or more questions where the mean values have to be added together. After this, they have to be divided by the number of questions multiplied by 4 which is the number of options each question has (Linked to the Likert scale). The example below illustrates Formula 4.1:

Formula 4.1 Constructs value

$$CV_n = \frac{\sum_n Q\ \bar{x}}{\sum Q \times 4}$$

Where:

CV_n= Conctruct value

$\sum_n Q\ \bar{x}$= Sum of the Questions in the Constructs means

$\sum Q\ \times 4$= Amount of questions in the construct multiplied by 4

The value generated from the formula will not exceed 1 and the higher the value the better the organisation is at using foresight as a skill measured with the relevant construct used in the formula.

Secondly the values generated from the construct within each element has to be added together and divided through the amount of constructs the element consisted of to get a value out of 1. The motivation for adding these values together is based on the fact that the organisation may lack in one area but be stronger in another. The formula is illustrated below in Formula 4.2:

Formula 4.2 Element value

$$E_n = \frac{\sum_n CV}{\sum n}$$

Where:

E_n= The element that is made up from the constructs.

$\sum_n CV$= The sum of the Construct in the Elements values added from Formula 4.1

$\sum n$= The sum of the amount of constructs used.

The final part of the calculation is multiplying the values of each element with one another. The reason for multiplying is based on the fact that these elements play important parts and without the one or the other there would be a significant decrease in the way foresight is used as skill. The formula is shown in Formula 4.3:

Formula 4.3 Foresight Formula

$$FS = E_1 \times E_2 \times E_3 \times E_4$$

Where:

FS= Foresight skill

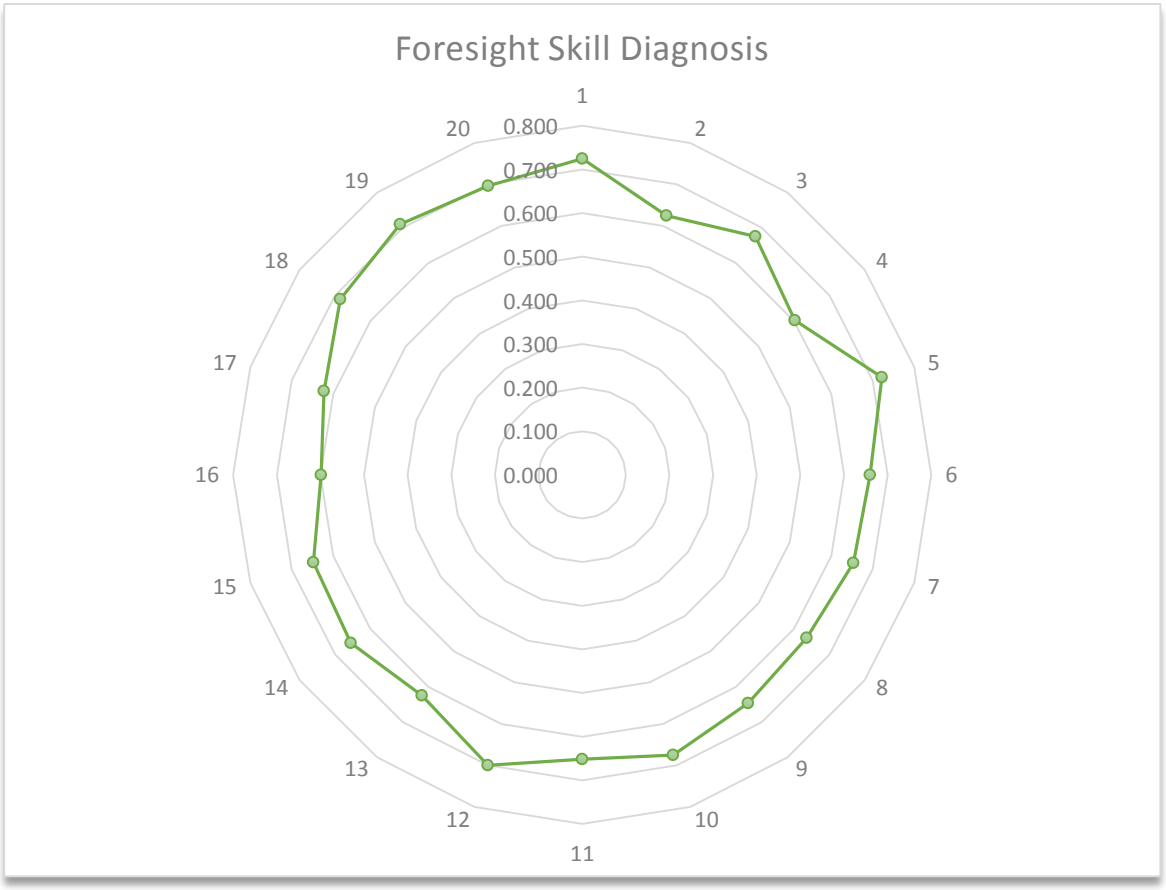
E_n= The Element used where each element will have a value that needs to be multiplied into the formula. The example below will illustrate the application of the formula to the empirical research from the study.

Table 4.1: Example of the Foresight Skill Calculation

Construct	Mean values					$\sum_n Q\bar{i}$	N of Q's	$\sum Q \times 4$	CV_n	$\sum CV$	$\sum n$	E_n	FS
	1	2	3	4	5								
1	3.08	2.72				5.8	2	8	0.725	2.628	4	0.657	0.19331
2	2.54	2.46				5	2	8	0.625				
3	2.9	2.72	2.48			8.1	3	12	0.675				
4	2.44	2.38				4.82	2	8	0.603				
5	2.9	2.88				5.78	2	8	0.723	2.036	3	0.679	
6	2.66	2.62				5.28	2	8	0.660				
7	2.9	2.36	2.58			7.84	3	12	0.653				
8	2.67	2.5	2.42	2.58		10.17	4	16	0.636	5.237	8	0.655	
9	2.66	2.48	2.62			7.76	3	12	0.647				
10	2.74	2.66				5.4	2	8	0.675				
11	2.8	2.38	2.68	2.57		10.43	4	16	0.652				
12	2.82	2.74	2.84			8.4	3	12	0.700				
13	2.46	2.54				5	2	8	0.625				
14	2.94	2.54	2.5	2.56	2.56	13.1	5	20	0.655				
15	2.64	2.54				5.18	2	8	0.648				
16	2.22	2.3	2.66			7.18	3	12	0.598	3.313	5	0.663	
17	2.54	2.44				4.98	2	8	0.623				
18	2.84	2.64				5.48	2	8	0.685				
19	2.88	2.8				5.68	2	8	0.710				
20	3	2.8	2.56			8.36	3	12	0.697				

From the Table 4.1 inserted above the Foresight Diagnosis spider chart in Figure 4.1 could be constructed using the CV_n values. Each of these construct represents a value out of one and the higher the organisation scores in the construct the better it is in the relevant focus area of the construct.

Figure 4.1: Foresight Diagnosis



From the following the calculations further the organisations' placement on the exponetial curve could be plotted on the line in Figure 4.2. The reasons for this line being exponential is due to the nature and rate at which technology itself is developing. The first law applicable in this essence is Moore's Law which states that the number of transistors on a chip doubles approximately every two years (Legado Accociates, 2012; Ward, 2012).

The second law to support is Gilder's Law which states that the total bandwidth of communication systems triples every twelve months. The third law is that of Metcalfe's Law which states that as a network grows, the value being connected grows

exponentially. Finally there is Less's Law which states that the cost of storage is falling by half every twelve months while capacity doubles (Quan, 2004; Ward, 2010).

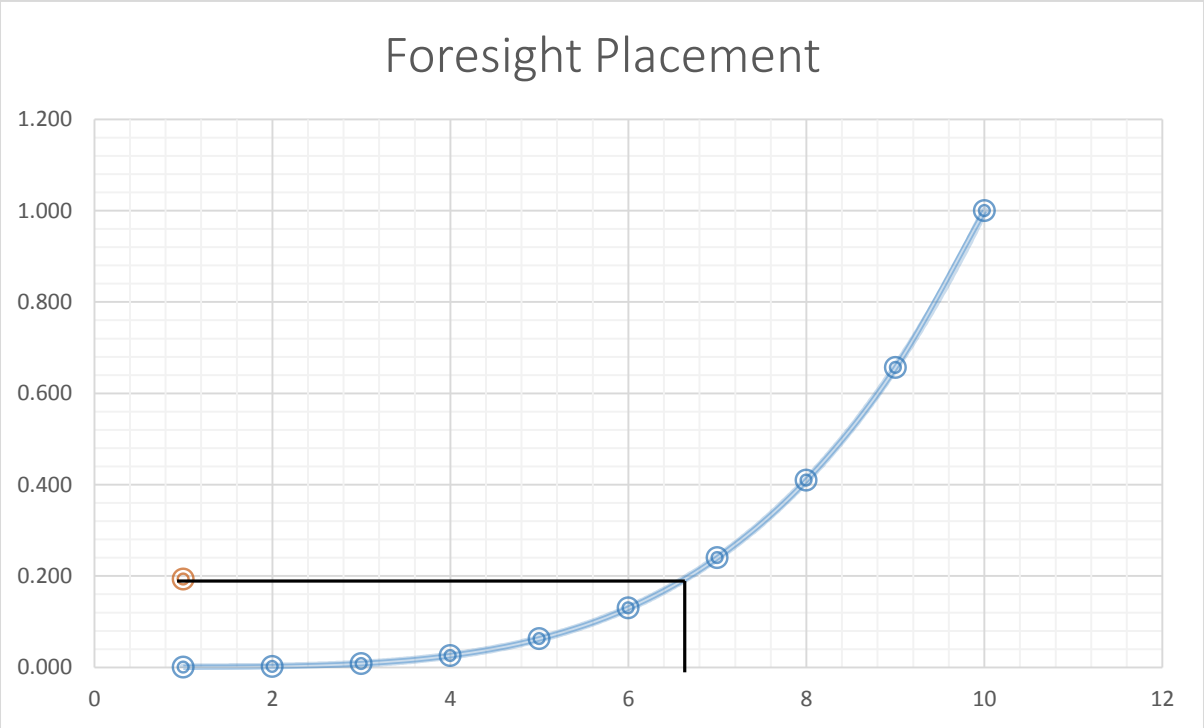


Figure 4.2: Foreight Position

The Table 4.2 below shows the placement of the Institution on Figure 4.2. The Point on X-axis can be interpreted as the percentage scored by the organisation. In this case it relates to 68% effectiveness in using foresight as a skill.

Table 4.2: Exponential curve calculation

	E1	E2	E3	E4	*FS*
Example	0.657	0.678	0.654	0.662	0.193
1	0.1	0.1	0.1	0.1	0.000
2	0.2	0.2	0.2	0.2	0.002
3	0.3	0.3	0.3	0.3	0.008
4	0.4	0.4	0.4	0.4	0.026
5	0.5	0.5	0.5	0.5	0.063
6	0.6	0.6	0.6	0.6	0.130
7	0.7	0.7	0.7	0.7	0.240
8	0.8	0.8	0.8	0.8	0.410
9	0.9	0.9	0.9	0.9	0.656
10	1	1	1	1	1.000

4.7 FUTURE RESEARCH

From the research conducted above the following recommended areas of research are available for exploration to further the field:

- Empirical research on the relationship between biographical information such as qualifications, age and years' experience compared to how effective foresight as a skill is used.
- The relationship that exists between the technology adoption life cycle and foresight.
- A comparative assessment of foresight as a skill in two major industries where one is the market leader and the second market followers.
- The development and identification of foresight styles within Higher Academic Institutions.

4.8 CHAPTER SUMMUARY

In chapter 4 the main findings of the empirical research study were discussed by combining the results from previous chapters. The various sections from the questionnaire were discussed along with the secondary and primary research objectives. The limitations of the study were explained and then the application of the results that led to the development of a proposed foresight skill formula.

This research was conducted from a humanistic perspective and aimed to contribute to the understanding of foresight as a managerial skill to better manage business decisions. It is thus an interdisciplinary study that provides a broader understanding on the various aspects of foresight and the application thereof. It contributes to a better understanding of the Higher Academic Institutions adoption of technology and their application of foresight.

The practical value from study lies within the newly developed questionnaire and the development of the foresight formula which enable a diagnostic assessment of the organisation's usage of foresight. It also provides a measurement tool to compare the institution with peers from similar industries.

This study can be seen as the foundation for the road to further develop an industry adaptable tool to measure organisations' foresight skills, identify weaknesses and assist in measuring their effectiveness.

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ANNEXURE A: RESEARCH INVITATION

Mr JC Coetzee
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Mr P.D Du Plessis
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Dear participant

Thank you for participating in this study on the use of foresight as a skill for managing business decisions within a higher academic institution. It forms part of the research I am currently conducting for the fulfilment of my MBA mini dissertation at the North West University.

The intended participants are staff employed in Higher Academic Institutions across South Africa. Data will be collected by means of a web-based cross-sectional questionnaire and should not take longer than 15 minutes to complete. Click here to access the questionnaire.

Your participation in the study is entirely voluntarily and your anonymity will be maintained at all times. Feedback will be made available upon request. If you have any questions about the research or your rights as a participant in the research, or getting feedback on the results of this research, please contact us to assist with your queries.

Your participation would be greatly appreciated in this study. Thank you for taking the time to consider the request and giving your valuable contribution. Please complete the questionnaire before the 12th of October 2014.

Yours sincerely,

P.D Du Plessis	Mr JC Coetzee
MBA student	**Study leader**

ANNEXURE B: QUESTIONNAIRE

Assessing the use of foresight as a managerial skill to manage business decisions in a Higher Academic Institution

Dear Participant.

Thank you for participating in this study on the use of foresight as a skill for managing business decisions within a higher academic institution. It forms part of the research I am currently conducting for the fulfilment of my MBA mini dissertation at the North West University.

The feedback from the questionnaires you have completed will be used to determine upon which factors foresight is dependent, how they influence the development of foresight, which methods are used, and to determine the critical skills needed for foresight and the impact of technology on foresight as a skill.

In the questionnaire there will be questions that require you to rate your organization on specific areas, as well as questions that will reflect your experience or perceptions relating to how foresight is used in your work environment.

Participation in this study is anonymous and voluntary. By completing this questionnaire online you give your consent that the results may be included in the research study. Feedback will be made available upon request. If you have any questions about the research study, or your rights as a participant in the research, or getting feedback on the results of this research study, please contact me at 083 564 5706 or send a request to pieterdp@live.co.za. Another contact is my study leader, Mr Johan Coetzee of the NWU on 018 299 4012.

This questionnaire consists of 101 questions and should take you 15 minutes to complete.

Section A: Biographical Details

1. What is your gender?

1	Male	2	Female

2. Please indicate your age group.

1	Under 20	2	20 - 25	3	26 – 30
4	30 – 35	5	35 – 40	6	41 – 45
7	46 – 50	8	51 – 55	9	55 – 60

3. Please indicate the highest level of qualification you have acquired.

1	No Matric	2	Matric Certificate
3	Certificate	4	National Diploma
5	Bachelor's Degree	6	Honours Degree / Post Graduate Diploma
7	Masters	8	Ph.D.

4. Which of the following is your field/fields of expertise?

1	Arts (Languages; Social and Government studies; Music; Communication; Philosophy)
2	Natural Sciences (Physical and chemical; Biological; Geo- and Spatial; Computer; Statistical and Mathematical; Environmental; Human metabonomics)
3	Theology (Ancient language and text; Minister training; Biblical counselling and Church ministry)
4	Education Sciences (Human and social science; Education studies; Natural science and technology; research in education science)
5	Economic and Management Sciences (Business School; Accounting; Economics; Business Management; Human Resources)
6	Law
7	Engineering (Chemical and Mineral; Electrical, Electronic and Computer; Mechanical and Nuclear; Industrial; Electromechanical)
8	Health Sciences (Biokinetics, Recreation and Sport; Pharmacy, Physiology, Nutrition and Consumer; Psychosocial Behavioural; Nursing)
9	Technology Management; Information, Communication and Technology.

5. Please state your position at your institution:

	Position	Fulltime	Part time
1	Campus Rector		
2	Vice Rector		
3	Dean		
4	Director		
5	Campus Manager		
6	Head of division		
7	Senior Lecturer		
8	Lecturer		
9	Junior Lecturer		
10	Other		

6. If you have chosen other, please elaborate.

_____

_____

7. How many years have you been at your organization?

1	0 – 5 years	2	6 – 10 years
3	11 – 15 years	4	16 – 20 years
5	21 – 25 years	6	26 – 30 years
7	30 years and more.		

8. Type of Higher Education Institution you are working at?

1	Public higher education institutions	2	Public FET College
3	Private FET College	4	Public AET Centre
5	Private AET Centre	6	SETA

9. Have you collaborated with any other Higher Educational Institutes?

☐ Yes ☐ No

Section B: Foresight factors and styles.

Foresight can be defined as a crucial function that is used to prepare for the future; not only to identify the promising technological pathways, but also to engage relevant stakeholders and create common visions into action (Könnölä *et al.,* 2010:252). Foresight is the ability to plan and think systematically about future scenarios in order to assist decision-making in the present and has been applied extensively by corporations and governments alike in crisis management (Constantinides, 2013:1657).

Please indicate, after reading the above definition and description of Foresight, on the scale below whether you *Strongly Agree, Agree, Disagree or Strongly Disagree* with the following statements.

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree
10. We are focussed on following the development of new technologies.	1	2	3	4
11. The application of new technologies in our institution is quickly adopted.	1	2	3	4
12. New trends are identified early on.	1	2	3	4
13. New trends are adopted quickly into the organization.	1	2	3	4
14. New trends has a major impact on how we operate within our business environment.	1	2	3	4
15. The use of new technology is welcomed by personnel.	1	2	3	4
16. New trends are accepted easily by personnel.	1	2	3	4
17. We use the identified new trends to develop suitable technology to gain a competitive advantage from the new trend.	1	2	3	4
18. We have a systematic design process which utilizes foresight.	1	2	3	4
19. We have created new value networks with the use of foresight.	1	2	3	4
20. There are sufficient organizational data collection systems.	1	2	3	4
21. Our company sees change as an unnecessary event.	1	2	3	4

22. Read the following statements and based on how you relate to them. Indicate on the scale whether you Strongly Agree, Agree, Disagree or Strongly Disagree.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. I distinguish between trends and fads and have good knowledge of history. I observe my environment and inform others around me about possible consequences and what can be expected of the future.	1	2	3	4
2. I am focussed on creating measures to ensure the best future is realized and gain insight form information about the future. I am motivated by my commitment to my goal.	1	2	3	4
3. I am driven by surviving in the present and trying to change the future by assuring the present is as good as possible. I focus on quick changing fads and short-term goals.	1	2	3	4
4. I get things done, specifically administrative tasks such as planning and organizing. I focus on the present but am interested in new innovations and can mobilize people to embrace the change from old to new.	1	2	3	4
5. I understand problems and know how to work around them instead of solving them. I prefer that there is a balance in the working environment and that things don't have to change.	1	2	3	4
6. I don't like new changes and prefer things the way they are. Change for the sake of changing isn't always good.	1	2	3	4

Section C: Strategic management and Foresight

"Strategy means making clear-cut choices about how to compete."

Jack Welch

After reading the above quote please indicate on the scale below how you would rate the following statements regarding the strategic management and foresight in your organization.

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree
23. Managers become uncertain when there are too many external changes.	1	2	3	4
24. Managers understand the changes in our industry.	1	2	3	4
25. Conducting an industry analysis is done when assessing the current strategy.	1	2	3	4
26. Environmental scanning is incorporated in strategic planning sessions.	1	2	3	4
27. Strategies are adjusted to accommodate environmental changes.	1	2	3	4
28. Our company has the capacity to actively develop external elements.	1	2	3	4
29. Our organisation is pushing the environment to be more in our favour.	1	2	3	4
30. Entrepreneurial activities are used to build the environment.	1	2	3	4
31. The organization has co-created goals with other businesses.	1	2	3	4
32. Alternative futures are used in planning.	1	2	3	4
33. Creative/Innovative thinking is encouraged.	1	2	3	4
34. Multi-disciplinary perspectives are taken into consideration with strategic planning.	1	2	3	4
35. Strategic planning is participatory with lower levels.	1	2	3	4
36. Roadmaps are used to determine the strategy of the organization.	1	2	3	4
37. Scenarios are used to determine the strategy of the organization.	1	2	3	4
38. Real options are used when determining the organization's strategy.	1	2	3	4
39. Resources cognition is applied to support new strategies.	1	2	3	4
40. Foresight is an in-formal part of strategic planning.	1	2	3	4
41. Building business networks is important to the organization's strategy.	1	2	3	4

42. The organization controls its position in the market.	1	2	3	4

Section D: Innovation management

Innovation within an organization plays a critical part in the success of the company, with regards to how innovation is managed. Please read the following statements and indicate whether you Strongly Agree, Agree, Disagree or Strongly Disagree.

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree
43. Internal entrepreneurship is encouraged.	1	2	3	4
44. Innovation within the organization has continually led to new products and/or services being designed.	1	2	3	4
45. Innovation is a driver for change in internal processes.	1	2	3	4
46. Innovation within our organisation has given us the competitive advantage over our competition.	1	2	3	4
47. Innovation has been driven by technological knowledge.	1	2	3	4
48. Innovation is driven by the discovery of market needs.	1	2	3	4
49. Innovation is deterred by the discovery of societal needs.	1	2	3	4
50. The organization's innovations process is sufficient in leading to the development of new services.	1	2	3	4
51. The organization's innovations process is sufficient in leading to the development of new products.	1	2	3	4
52. There are feedback systems between new technologies and the new market need.	1	2	3	4
53. Various departments contribute to innovation process.	1	2	3	4
54. Radical innovations has never put our organization at risk of losing market share.	1	2	3	4
55. The innovation system of our organization is quick at discovering, incubating and accelerating new innovations.	1	2	3	4
56. Cannibalization of products occur when new, better innovative ideas are in place.	1	2	3	4

57. Technological disruptions are the most important drivers of disruptive change.	1	2	3	4
58. Our organization has identified a set of standard trends to help manage innovation.	1	2	3	4
59. Individuals recognize the value of new information in the organization.	1	2	3	4
60. Groups recognize the value of new information in the organization.	1	2	3	4
61. The institution recognized the value of new information in the organization.	1	2	3	4
62. Accumulated experience improves the innovation of the organization.	1	2	3	4
63. Factors that leads to change have been identified in our industry.	1	2	3	4
64. Sustainability is taken into consideration when identifying new trends.	1	2	3	4
65. We have a framework to audit our innovative capabilities of the whole institution.	1	2	3	4
66. There is an audit framework that focuses on each department specifically.	1	2	3	4
67. The organization has sufficient resources supporting innovation.	1	2	3	4
68. We are familiar with our competitors strategy.	1	2	3	4
69. We are familiar with our competitors' industry evolution.	1	2	3	4
70. The internal cultural environment in the organization is conducive to innovation.	1	2	3	4
71. Management values the strategic importance of entrepreneurial initiative.	1	2	3	4
72. The organization manages technology to its advantage.	1	2	3	4
73. Our technology management has a cross-discipline approach.	1	2	3	4
74. Our life cycles for products have shortened.	1	2	3	4
75. The organisations idea to market lead-time is flexible enough to react quickly to changes.	1	2	3	4
76. International competition has pushed our organization to apply new effective technologies.	1	2	3	4
77. Customers drive internal decisions making.	1	2	3	4

78. Disruptive technologies are implemented without hindering existing customer relationships.	1	2	3	4
79. Customers have become co-creators of value to the organizations products and services.	1	2	3	4

Section E: Future Research perspective

Future research is used as term to describe the whole range of research conducted to help organizations, individuals, and governments explore and prepare, and respond to changes in the environment. With regards to how future research is considered please read the following statements and indicate whether you Strongly Agree, Agree, Disagree or Strongly Disagree.

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree
80. Governmental policies hinder our organization's implementation of new technologies.	1	2	3	4
81. Government funding is made available for our organization to implement new technologies.	1	2	3	4
82. The organization has increased its stakeholder participation with the creation of new insight.	1	2	3	4
83. Our aim is to predict changes.	1	2	3	4
84. Our organization focuses on exploring possible changes.	1	2	3	4
85. Dominant logic hinders the acceptance of alternative developments.	1	2	3	4
86. Everyone in the organization is encouraged to participate in foresight activities.	1	2	3	4
87. Actors and boundary spanners are used to gather external information into the organization.	1	2	3	4
88. Staff has the adequate ability to identify trends.	1	2	3	4
89. Experts and decision makers are involved in the foresight process.	1	2	3	4

90. Please select the methods of future studies you apply the most in your organization.

1	Scenario Analysis	34
2	Technology Forecasting	18
3	Road mapping	24
4	Back casting	4
5	S-curves	0
6	Delphi studies	0
7	Mathematical models	10
8	Other	10

91. If you make use of another method, please elaborate.

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Statements	Strongly Disagree	Disagree	Agree	Strongly Agree
92. Our products and services have shortened lifecycles.	1	2	3	4
93. The organization operates in a fast technological changing environment.	1	2	3	4
94. The organization constantly has to update its strategy due to the speed of innovation.	1	2	3	4
95. Workshops are great for idea generation.	1	2	3	4
96. Idea generation helps the organization build its internal knowledge.	1	2	3	4
97. The organization has one or more vision of the future.	1	2	3	4
98. Images for the future is used to guide innovation within the organization.	1	2	3	4
99. There is a clear transition path from the present to the future.	1	2	3	4
100. Workshops motivate me to share ideas.	1	2	3	4

101. What do you see as the critical trends for your organization? Please elaborate.

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102. What do you see as the next big thing for your industry? Please elaborate.

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ANNEXURE C: LETTER FROM LANGUAGE EDITOR