STRATEGIC RESPONSES TO TECHNOLOGICAL TURBULENCE: A CASE STUDY OF IBM AFRICA

BY

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UNITED STATES INTERNATIONAL UNIVERSITY-AFRICA

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STUDENT’S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than United States International University in Nairobi for credit.

Signed ___________________________ Date ___________________________
Saska Doreen Shimuli (633191)

This project report has been presented for examination with my approval as the appointed supervisor

Signed: ___________________________ Date ___________________________
Prof. Maina Muchara, PhD

Signed: ___________________________ Date ___________________________
Dean, Chandaria School of Business
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DEDICATION

To my loving parents Howard and Beatrice, and my siblings, Debra, Donna and Clive for their incessant support, encouragement and love as I pursued my life’s desire.
ABSTRACT

Change is a constant in life, and this is no different in business. As change is inevitable, how then can businesses respond, more so to technological dynamics? In order to ensure a business is sustainably profitable and competitive, it needs to make critical decisions which will determine its future. This means that managers need to know how, when and what to respond to; a question which this paper sought to investigate. The purpose of this project was to undertake an evaluation of the strategic responses to technological turbulence, utilizing International Business Machines, Africa (IBM) as a case study. The research was guided by three research questions which sought to establish the extent to which disruption, uncertainty, and product obsolescence led to strategic response. The strategic responses examined were knowledge creation, research and development, skill development and strategic partnerships. The study was conducted using a descriptive research design, drawing from a population of 800 employees from IBM Africa. Data collection was done through a research survey with 72 out of the 105 sampled units reverting back with responses, which represented a sixty-nine percent (69%) response rate. After collection, the data was then analyzed using a computer analytical program with inferential and descriptive statistics to test the hypotheses. The study revealed effects of disruption, uncertainty and product obsolescence on strategic response. Uncertainty had a negative effect, while product obsolescence had a positive influence on the strategic responses examined. From the findings, it became evident that businesses should not ignore the dynamic nature of the environment they operate in, but rather take appropriate actions to safeguard or develop their competitive edge. The study also showed that product obsolescence was the highly affecting variable on strategic response, pointing to the constant need for companies in the technology industry to innovate and produce state of the art solutions. In order to stay ahead of the competition then, an organization needs to invest in strategies which will guide in implementing effective and adequate responses to change in the technology environment. The study concluded that there is a high level of disruption, uncertainty and product obsolescence in the technology industry, which when put together represent a high level of technological turbulence. It was also concluded that a firm should strive to react to turbulence present in the environment. In tandem with the findings, the study recommends that an organization should closely monitor the trends in their respective environment, and adequately respond to them through avenues that would have the most impact and benefit. Moreover, although accuracy cannot be achieved as far as the prediction of the
future is concerned, managers should observe the trends and be pacesetters in the industry, guided by the needs of customers and the prospects of tomorrow. Finally, the study revealed that firms should not stick to traditions or protect their existing portfolio, but would rather aim to constantly innovate, not only to beat the competition, but also to constantly improve. For further research, future researchers in this area should conduct studies on other aspects of technological turbulence which were not highlighted in the study. This would serve to holistically understand the component of technology in a business and how firms should correctly deal with it. In addition to this, researchers can explore other components of the macroeconomic business environment such as political, legal, social, environmental aspects. Lastly, as this research used International Business Machines (Africa) as a case study, the same can be done in other firms across various industries. This would serve to consolidate the knowledge around technological change in various industries and inform business leaders and policy makers on how important and impactful technology is to an industry.
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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Those who survive over time, have been reckoned to be those who adapt to the environments they are present in. This is not only seen in nature, with the theory of evolution, but also in business. The dinosaurs of yesterday, are now fossils due to their inability to adapt to the environment that they resided in. In view of business, since the 1970s, the period of stability was violently brought to a halt, and in its stead, an era of risk and instability was ushered in as the only certainty in business. This era of risk is widely known as turbulence. Turbulence by definition refers to a phenomenon that is non-linear, erratic and irregular (Drucker, 1994). To bring it to perspective as far as business management is concerned, turbulence can be seen as the rate of change in the “composition of customers and their preferences” (Drucker, 1994). It therefore refers to an unsteady, unpredictable, ever-evolving customer needs, accelerated by the drastically changing levels of technology. The essential critical causes of these changes are the consumer and technologies. A lot of the environmental stability which was a given at the time prior to the 1960s, is now something that can only be hoped for.

Market leadership is a dangerous position, as the percentage of companies dropping from the top three rankings in their industries has increased from 2% in 1960, to 14% in 2008. Moreover, when a company attains market leadership, it does not necessarily mean that profitability is a sure consequence. According to Reeves and Daimler (2011), the probability that the company in the market leadership position is also the company leading in profitability has declined from 34% in 1950 to a mere 7% in 2007. Over and above that, executives are increasingly finding it difficult to properly and succinctly identify both the industries they are in and the competitors they are up against. These changes in the environment have made it complex and challenging for organizations to map out strategies for sustainable success. Firms operating in the technology industry, are faced with pressures from demanding customers who are in need of faster and more efficient technologies, giving rise to the concept know as technological turbulence.
As change is true across various industries, it is even more fierce and dynamic in the technological world. Environmental turbulence can comprise of many factors, but the three most commonly cited components are market turbulence, technological turbulence and competitive intensity as captured by Ottesen and Gronhaug (2004). Jaworski and Kohli (1993) cite that technological turbulence is concerned with the rate of change of product and process technologies used to transform inputs into outputs, while Moorman and Miner (1997) define it in a narrower sense, seeing it particularly as change associated with new product technologies. Some researchers have even gone as far as regarding technological turbulence as the single most important component, as demonstrated by Mason who says that “environmental turbulence is caused by changes in, and interaction between, the various environmental factors especially because of advances in technology and the confluence of computer, telecommunications and media industries” (2007, p.11). Mason and Rosson (2006) offer the definition of technology turbulence as “competency destroying innovation”, which implies the drastic nature of the changes in technology.

So what is the level of turbulence experienced among companies operating in the technology industry? Ansoff and McDonell (1990), described five levels of turbulence, which are comprised of repetitive, expanding, changing, discontinuous and surprising levels. The first level is known as the ‘repetitive’ level where the environment repeats itself time after time, without major changes. The second level depicts the ‘expanding’ stage where change is incremental, visible, slow and predictable. The next level is referred to as ‘changing’ where the environment presents a fast pace of change albeit fully visible and incremental. On levels 4 and 5, are where turbulence is strongest. The ‘discontinuous’ level, denoted as level 4, presents a partially predictable and visible environment characterized by rapid change and an inability of the firm to react to the new change within the required time frame. The final level known as ‘surpriseful’, represents an environment without visibility, unpredictability and disruptive change (Ansoff & McDonnell, 1990). The level of turbulence in the technology industry, is perhaps one of the highest experienced in the globe today. The inability to stay abreast with new product introductions, for instance, can ultimately lead to failure for firms in technology driven businesses. Firms such as Nokia and Dell, which were once pacesetters in their respective industries no longer dominate their industries, as a matter of fact, Nokia
has been acquired by Microsoft owing to the intense competition and instability in its operating environment (McCann, Selsky & Lee, 2009). From this, one can infer that the technology industry would rank as being in the discontinuous and surpriseful levels of turbulence, as the level of change is rapid, with little or no predictability or visibility of the future.

Managers are quickly finding out that to succeed in this era of instability, they can no longer be good at doing a particular thing, but by being really good at learning how to do new things critical for survival (Reeves & Daimler, 2011). Those that will be successful in this century need to be not only quick to notice the patterns of change, but to also act on them (McCann, Selsky & Lee, 2009). They would need to be able to experiment frequently, fast and at a low cost, not only as far as products and services are concerned, but also with their strategies, processes and structures (Reeves & Daimler, 2011). Due to this, the organizations would need to have a great amount of capability on producing various strategic initiatives within the company as necessitated by the tumultuous environment without. The capabilities that are adopted would then have a great impact on how an organization can sufficiently deal with high levels of technological turbulence. This brings us to the idea that companies need to deal with the turbulent environment in a way that will produce the sustainable success that static strategies aimed to achieve (Drucker, 1994).

In essence, a strategy is a coordinated set of actions laid down to achieve a firm’s desired goals, over a period of time (Beinhocker, 1999). The aim of most strategies in place today are to build a sustainable competitive advantage, and position the respective companies at a competitive space or assembling the right core competencies necessary for a strong/valuable proposition to the customer. Position, scale and capabilities are static, antithetical to a highly technologically turbulent environment which requires constant changes in approach of doing business. The strategic decisions that firms undertake are better known as strategic responses, and are taken in response to changes in the environment (Mwangi, 2008).

According to Pearce and Robinson (1988) strategic responses represent a set of actions which lead to creation and implantation of future term plans that seek to safeguard a company’s survival and profitability. As has been elaborated before, management needs to adapt to the
complex changes in the environment in order to thrive. By responding adequately, a firm is not only concerned with taking advantage of opportunities that present themselves in the environment, but also with identifying the existing resources that can be used to create opportunities and competencies in the market.

For assured effectiveness and success of firms, management should react in an appropriate manner to the respective environment that they operate in. As a result, the strategic response ought to take the environmental challenges and customers into account. By scanning the environment constantly and taking appropriate action, an organization is able to pinpoint the conditions and trends that will greatly influence the industry that they are in. (Thompson and Strickland, 1993). Strategic responses take many shapes and form in tandem with the long term goals of a firm. If a firm foresees that to survive in the market would require large market share, they can opt to diversify by introducing new products, if they are aimed at achieving maximum profitability they might opt to adopt a focused strategic response to accomplish their purposes. These are just but a few examples of the responses a company can take in response to environmental changes. The focus of this paper shall be environmental changes caused by technology dynamism, better known as technological turbulence.

According to Lichtenthaler (2009), technological turbulence is a factor in the external environment of a firm, besides market turbulence and competitors’ intensity. Jaworski & Kohli (1993), define technological turbulence as “the rate of technological change in an industry.” This aspect of turbulence affects many industries as technology is increasingly becoming a differentiator of a highly profitable business and a poor business. The degree of changes in the technological aspect of an environment signals a change in processes of a business or new products that change customer needs radically, rendering previously successful products useless. Technological innovation and entrepreneurship have been recognized as the main drivers of industrial growth as well as a major cause of social disruption through the obsolescence of existing technologies, businesses and economic systems, describing it as creative destruction. For companies that have built their businesses around offering technological capabilities to clients, technological turbulence is a factor that they should be keen on if they are to succeed.
IBM, better known as the “Big Blue” is a technology company, which was founded in 1911, and headquartered in New York. In its nascent stages, the firm focused on the business of tabulation and collection of data through the use of punch cards. The company however was not known by its current name, but as Computing-Tabulating-Recording Company, reflecting the core business of the firm. When Thomas Watson joined the organization as CEO in 1914, the business began catering to the needs of businesses through the offering of technical solutions that would streamline operations and ultimately lead to increased profitability. In ten years, the company had expanded to serve clientele throughout United States and many parts of Europe. With the increased business and client needs, the company expanded its product portfolio greatly, and it is in this time period that the firm’s name was changed to International Business Machines (IBM), in a bid to reflect its worldwide expansion. IBM has been known to produce innovations such as punch cards, ATM machines, personal computers for business and personal use through collaboration with Microsoft and Intel, supercomputers, local area networks among many others. In spite of many successes, the company has underwent a series of shifts that has seen it fight for its survival (Kralingen, 2010; Drucker, 1994).

In the 1980s to early 1990s, the company was at the height of its success. They had managed to invent computing for business, had several researchers winning prestigious awards including the Nobel Prize, as well as succeeding in sending the first man to the moon. At this time, the revenue and market share of the company was at an all time high and customers would clamor for the latest products. This was suddenly brought to a halt in 1993, when the company announced the biggest loss at the time of $8 billion, owing to the fact that the company had not responded to crucial technological shifts. Publications warned against associating with IBM, as it had failed to read the signals and react accordingly (Kralingen, 2010). However, under the leadership of Lou Gerstner, the company was able to turn around and introduce a portfolio which sought to provide integrated technological solutions for business. Within a short period of time, the company had a successful turnaround and were able to get back to stability. What are they doing now in a technologically turbulent environment? Do they respond to shifts and movements? If so, how?
There are many factors that have accelerated the growing involvement of multinational companies in emerging economies like Kenya. Favorable trade policies, reduced tariff barriers and increasing purchasing power are some of the measures the government has taken to increase the level of foreign direct investment in the country (Akhter and Barcellos, 2013). This has seen an increased level of attraction of the domestic market by multinationals such as IBM, who aim to exploit opportunities available in Kenya. Owing to the fact that the company has been in existence for 100 years, it would be a worthy question to examine what are the responses that they have employed to remain relevant in a fiercely contested market. IBM is in the technology space which means that the firm has had to deal with many technological changes which would have wiped them out, a plight that is evident in many firms who have operated in this space.

1.2 Statement of the Problem
The great level of dynamism in the technological environment means that firms are faced with different challenges from time to time. As Ansoff and McDonell (1990) posit in their strategic success hypothesis model, an organization’s capacity and capabilities need to be matched with the conditions in the environment. Mwangi (2007) posits that it would be important to pursue further studies on strategic responses to changes in other industries, as different industries cope with different macroeconomic factors. This is reinforced by Ansoff and McDonell (1990), who argue that it is impossible to create a single remedy that would equally and effectively apply across all businesses in different industries. On this premise it becomes important for studies to be carried out on specific industries, as has been demonstrated above. The dynamic components in the environment that keep organizations alert consist of economic, political, social and technological variables, which greatly affect the decisions which a firm makes (Pearce and Robinson, 2013). It is thus imperative to know how firms respond in the face of constant change, and particularly, technological change.

The failure of businesses in the face of technological change has been an area of intense research and debate in strategy literature (Schumpeter, 1934; Henderson 1993; Sood & Tellis, 2010). This phenomenon is comprised of three key components namely; disruption (Sood & Tellis, 2010; Verspeet, 2013), uncertainty (Geissler & Krys, 2013; Rosenberg, 2008) and short product life cycles (Lu & Marjot, 2008; Elg 2015). Christensen, Raynor and
McDonald (2015), found that it is highly important for incumbent firms to react to new threats brought forth through disruptive technologies and should not leave anything to chance. They proposed that a way in which firms can react to this phenomenon would include collaboration with competitors, acquiring firms with desired technology and encouraging learning throughout the organization. Sood and Tellis (2010), call for research on change in technology and the effects that it causes on firms and markets be examined which presents a gap worthy of investigation.

Geissler and Krys (2013) reveal that the underestimation of uncertainty can be dangerous. With the high levels of uncertainty in the environment, Giessler and Krys (2013), clinging on to dogmas and treading the beaten path will ensure firms do not get the right answers to customers’ problems. As a result there needs to be a response to this in form of acquisitions, alliances, knowledge creation and research development (Rosenberg, 2007). Although researchers have found that the responses cited above are important in gaining a competitive edge, a gap still persists on whether they are direct responses to uncertainty, and if so to what degree.

Alipour, Idris and Karimi (2011) cite that creating a competitive advantage and optimizing organizational performance in a complex and dynamic environment, requires an ability to create and transfer new knowledge and practice. They further cite that complex environments are characterized by rapid introduction of products, which point to short product life cycles, a common feature of the technology industry. In a bid to achieve a sustainable competitive advantage a firm should adopt knowledge creation as a strategy in response to the constant changes which firms face (Ichji & Nonaka, 2007). The researchers recommended further study on this in order to validate its position; though their findings showed that knowledge creation was a critical factor in remaining competitive. This presents an opportunity for investigation on the importance of knowledge creation in an industry where the life cycles of products are increasingly shortened.

This study therefore aims to examine the strategic responses that a company, whose primary business is the provision of technology, would undertake in a highly turbulent technological environment. With firms on the lookout for the newest means to combat highly volatile
environments giving them a competitive advantage for sustainable profitability, one would argue that the responses caused by the level of change would be a worthy area of study. This knowledge gap presents an opportunity for research, which this paper aims to exploit.

1.3 Purpose of the Study
The purpose of the study is to explore the different strategic responses international technology companies adopt in response to the changes in technology in the environment that they operate in.

1.4. Research Questions
The research will be guided by the following questions:
1.4.1 To what extent does disruption lead to strategic response?
1.4.2 To what extent does uncertainty lead to strategic response?
1.4.3 To what extent does product obsolescence lead to strategic response?

1.5. Significance of the Study
The challenges faced by a technology firm are simply numerous, and knowing how to engage different for a multinational corporation can seem daunting. Through proper analysis of regions and contextualization of the factors that would affect turbulence levels, firms in this category will be able to compete more knowledgably. The stakeholders who will benefit from this study are: local and multinational technology companies, the government, and other scholars and academicians.

1.5.1 Local and Multinational Technology Companies
These stakeholders stand to benefit as a result of the scope of study which seeks to understand the industry in which they operate in, and what factors they should pay close attention to in order to elicit a response to gain or keep a competitive advantage. It will guide in policy making as far as how the respective firms should decisively deal with the changes in the environment.

1.5.2 Government
In a bid to increase investment in the ICT sector which is critical to the attainment of the Vision 2030, the government will need studies that provide a clear picture of the ICT operational environment.
1.5.3 Scholars and academicians
The study seeks to carry out a thorough investigation on the impact of turbulent environments on the rate of change of management. It will serve to be a source of insight for other scholars who will pursue the areas that the paper shall touch on.

1.6 Scope of the Study
The study will be carried out in IBM Africa, and shall involve staff members of the organization. A limitation that could be expected is that the participants in the study will not give honest responses.

1.7 Definition of Terms
1.7.1 Strategy
Strategy is performing different activities from rivals, or performing similar activities differently to achieve a desired goal (Porter, 1998).

1.7.2 Turbulent Environment/Turbulence
The pace and disruptiveness of change within an operational, competitive or larger contextual environment (McCann, Selsky, & Lee, 2009).

1.7.3 Technology
A platform based on unique scientific principle on which firms create products used to serve the needs of consumers in a specific market (Sood and Tellis, 2010).

1.7.4 Technological Turbulence
This is the change associated with new product or process technologies. (Moorman and Miner, 1997).

1.7.5 Disruption
Severe surprises and unanticipated shocks that destabilize performance, even threaten ongoing viability (McCann, Selsky, & Lee, 2009).
1.7.6 Uncertainty
The inability of an individual or an organization to predict future occurrences with complete accuracy (Giessler & Krys, 2013).

1.7.7 Product Obsolescence
This is the tendency for products in becoming obsolete, outdated and without use (Lu & Marjot, 2008).

1.7.8 Technology Industry
Information and communications technology (ICT) is an extended term for information technology (IT) which stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information (Drucker, 1994).

1.7.9 Strategic Response
A set of commitments, actions and decisions taken by a firm to achieve a competitive advantage and earn above average returns (Ansoff & McDonnel, 1990).

1.8 Chapter Summary
This chapter has provided a background of the study, and the knowledge gap that the study aims to fill. The challenges of operating in a rapidly changing environment has also been given, with the aim of relating them to the research questions that shall be explored extensively in this paper.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter will address the review of literature on response to a technologically turbulent environment. The review will include the effect of disruption, uncertainty and product obsolescence on strategic responses employed by organizations.

2.2 Disruption and Strategic Response

Primarily, the impact of technology cannot be ignored and has come to be considered essential by individuals, businesses and governments around the globe. For the individuals at the forefront of pioneering new technology, a major concern is how their intended clients interact with the technologies and what processes they are easing/problems it is solving. According to Lane (2015), technology can be described using three main foci. Primarily, it is concerned with implementing ideas that serve to satisfy a human need rather than science which merely aims to understand how the natural world operates. An example of this would be the invention of the microscope which was intended to cater to the need of exploring the world which our human vision cannot see. Secondly, technology not only utilizes facts and practical knowledge, but also constitutes of values and creativity. An example of this would be the iPod of Apple Inc. which integrates the law of physics by holding thousands of songs in a device and creative design to make an iconic product. Finally, technology is an organized way of doing things, where it caters to intended and unintended interactions between products and the people who make, use, or affected by them in various processes.

Christensen, Raynor and McDonald (2015) cite the growing interest and exploration of the disruption theory in academic circles, and attempt to define the phenomenon while pointing out the misguided understanding of what disruption is. According to them, disruption is not used to describe any event in which an industry is agitated and the incumbents fall, but it however represents a process where a smaller firm with lesser resources is able to effectively challenge incumbent businesses. This is enabled by the fact that incumbent businesses focus on improving products for their current business segments (sustaining innovation), while
overlooking seemingly inferior segments which would then give rise to opportunities that
ew entrants can exploit to cause a disruption. In most cases, disruptive businesses develop
seemingly inferior products, with a focus on neglected needs or customer base. In due time,
the disrupting firm is able to improve on its products and make its way into a market that on
the onset seems impenetrable (Christensen, Raynor & Mcdonald, 2015).

Disruption can take many forms, as Sood and Tellis (2010) describe in their study of
demystifying disruption. According to their findings, there are three domains of disruption;
namely, firm, demand and technology disruption. Firm disruption takes place when the
market share of a business whose products use a new technology exceeds the market share of
the largest firm whose products use the highest-share technology. Highest-share technology
refers to the technology with the highest market share at the time a new technology makes an
entry into a market. In this form of disruption, an existing business or a new entrant can
disrupt the dominant firm in a particular technology. On the other hand, demand disruption is
experienced when the total share of products in a market based on the new technology
surpasses the share of products that are based on the dominant technology.

Last but not least, is the phenomenon of technology disruption which drives the other two
forms of disruption, and has been widely explored in various studies as pointed out by
Christensen, Raynor and McDonald (2015). Sood and Tellis (2010) describe it as a
technology which outperforms dominant technology various dimensions, but primarily in
performance. Verspeet (2013) supports this definition by citing disruptive technology as a
technology which alters the bases of competition on which firms compete by through
transformation of performance metrics.

The meaning of this is that every technology that is developed for the market by established
firms has limitations, as will a disruptive technology which will have a different set of
attributes with its subsequent limitations. The disruptive technology will improve rapidly
over time to a certain point, and surpass the performance of the dominant technology and will
be as valued as the old technology by consumers (Verspeet, 2013). In the end it will change
the way firms compete through the introduction of a new performance metric using
components that were not a part of the competition before (Bower and Christensen, 1995,
Market disruption encapsulates all the three forms of disruption. As the research is focusing on the technological aspect of the external business environment, technology disruption will be given most emphasis. According to Verspreet (2013), Christensen who popularized the theory of disruptive technology which was renamed to disruptive innovation, has a good mastery on the subject and as such, a summary of his definition will be provided. A disruptive technology begins with a product which initially is not comparable to superior dominant products, which is valued by a small segment of customers. The product is typically cheaper, smaller, simpler or offering greater convenience. Existing firms deem investment in the technology is irrational as profitable customers do not want to use new products based on the new technology. The disruptive technology is improved so that new products match or exceed performance and market share of existing products and subsequently displace market incumbents (Christensen, 1997).

As change is eminent what are the steps a business should take to prevent death, or as Schumpeter (1930) put it, ‘creatively destroy’? Primarily, it can be seen from the definition of disruptive technology that change is bound to occur and businesses need to lead the changes or adequately react to the changes in order to survive. Verspeet (2013) cites that incumbent players have little incentive to change approaches on creation, production and selling of a product. Sood and Tellis (2010), cite that incumbents are unlikely to disrupt due to the assured revenues they enjoy with their existing portfolio, do not fully appreciate the threat of new technology and have made huge investments to produce the products in the market. When an incumbent business opts to destroy its current strongest product portfolio in order to support new innovations, a dilemma arises, which Christensen (1997) labels as the “the innovator’s dilemma.” In the digital camera case, as much as Kodak was investing in research and development in digital photography, they were unable to retain their market leadership position due to the innovator’s dilemma. However, in the same light there are examples of incumbents who have been able to react to change effectively when faced with new entrants riding on disruptive technology. IBM, an established firm in mechanical business equipment was able to forge new paths in electronic business equipment (Verspeet, 2013).
2.2.1 Strategic Responses to Disruption

Verspeet (2013) cites that incumbents unlike entrants have enough resources to innovate and thus prevent death by disruption, but often do not put them into use or are used for wrong investments. Secondly, processes determine how nimble an organization is to adapt to change and thus survive the effects of disruption (Bower and Christensen, 1995). Thirdly, the values that employees espouse will determine how flexible and adaptive an organization will be to changes in technology. An organization which values steady and highly certain revenues will fashion the organizational culture around ensuring this, which could stifle innovation and the knowledge creation which comes along with it (Verspeet, 2013). Creasey, (2009), conducted a study of 98 companies in which the findings reflected a pattern on how firms react to disruptive innovation. The four ways that companies responded were: focus and innovate in traditional business, ignore happenings, strike back by using product attributes to attract customers, and finally adopt new innovation completely. The different responses to disruption are well presented in the following Figure 2.1:

Figure 2.1: Responses to Disruption

Verspeet (2013) mentions that the most successful incumbent firms are those which adopt an ambidextrous approach where a firm exploits its current market and explores new possibilities. The key to developing radical innovations and protecting core business is by innovating incrementally on current business and look at different markets and explore options that meet their needs. O’Reilly and Tushman (2004) examined 35 initiatives created by established firms and compared their ways of doing business. 90% of their pool, who were ambidextrous firms were able to reach their goal, which was guided by the design and management practices used. He and Wong (2004) who looked at technological innovation by observing 206 manufacturing firms, found that ambidextrous firms are those that score high on exploitative and explorative innovation strategies, and has relatively equal emphasis on both aspects. This is presented by He and Wong (2004) who present their findings based on examination of the ambidextrous firms in their study. According to the study, the lack of balance between exploration and exploitation strategies leads to a negative effect on sales growth, while relative equal interaction between the two positively affect sales growth.

Alipour, Idris and Karimi (2011) pointed out that creating a competitive advantage and optimizing organizational performance in the complex and dynamic environment organizations operate in, requires an organization’s ability to create and transfer new knowledge and practice. In this century, the success of a company will be driven by the extent to which an organization’s members can exercise their intellectual capabilities through the creation of knowledge (Nonaka & Takeuchi, 1995; Drucker, 1985; Porter, 1986). In a bid to achieve a sustainable competitive advantage a firm should adopt knowledge creation as a strategy in response to the constant changes that technologically oriented firms face.

Cummings and Kiesler (2003), refer to innovation as the “successful implementation of creative ideas, tasks or procedures.” Creative ideas come about through social interactions that facilitate sharing and creation of knowledge. According to this, one can understand that knowledge is a key ingredient in innovation, and as is noted by Nonaka and Takeuchi (1995), the extent of use of knowledge both from within and without the organization, has a positive influence on a firm’s innovative performance. Moreover, it is argued that the amount of new knowledge acquired and applied determines the degree of innovation in an organization (Creasey, 2003).
The creation, dissemination, and application of new knowledge throughout the entire organization are catalysts of a firm’s innovation. Innovation is focused on a continual generation of knowledge in a bid to recognize new opportunities and develop new products, services and processes (Nonaka & Takeuchi, 1995). Through socialization and externalization, tacit knowledge is generated and communicated to others, which offers a basis for creation of new concepts and as a result exploratory innovation (Creasey, 2009). The process of knowledge creation, does not automatically lead to improved organizational performance and capability of dealing with a technological turbulent environment.

Capabilities that aid in sustainable competitive advantage are rooted in how a firm can turn knowledge into action and less by the knowledge itself (Alipour, Idris & Karimi, 2011). Learning companies that are successful in creating new knowledge are keen on their successes and failures and questioning established knowledge in a bid to get a way that will be of maximum benefit to them, and more particularly the organization as a whole. Companies associated with learning and consequently knowledge creation are highly social and people learn as they interact with each other. All individuals in such organizations are encouraged to constantly gather data, and are made aware of the kind of knowledge that will enable the organization remain relevant in the industry that they operate in, so that they can catch areas to exploit. Organizations that are able to continually innovate by producing new products, services and processes, and thus deal with disruption, are those that create new knowledge and are able to apply it to provide solutions (Alipour, Idris & Karimi, 2011; Edersheim, 2007; Drucker; 1985).

Skills and technologies are inextricably linked as skills are required to produce knowledge that will lead to the creation of innovations and technologies. A skilled workforce is a major impetus for the creation, transfer and diffusion for knowledge which provides a basis for innovation (Grimshaw and Jones, 2012. Skilled workers play an important role in the transfer of knowledge within a firm, as well as to entities external to the firm. This can happen through collaboration on R&D and technical problem solving, or in the interaction between members of an organization. The expedition of skill development and technologies almost always leads to the development and implementation of specific projects that are aimed at improving efficiencies or producing innovations that drive the value of a company.
Moreover, successful innovation always gives rise to a demand for new skill sets in order to drive successful delivery, which would give rise to the need of skill development in an organization. A key firm strategy is to take advantage of its competencies in order to build capacity, which is the ability to develop and realize strategic moves that fit with the ever dynamic circumstances. For firms to identify and utilize knowledge, ideas and technologies generates elsewhere, what is required is a dynamic capability and absorptive capacity, which can be created through the development or acquisition of high levels of workforce skills (Grimshaw and Jones, 2012).

2.3 Uncertainty and Strategic Response

In spite of the many complex models designed to predict changes in events in the future, none has been able to predict the future prospects of the business environment with significant accuracy. For the most part, future developments and trends are obscure, serving to show the high level of turbulence in the environment and more specifically, the technological environment. Rosenberg (2007) mentions that technological change is indeed characterized by technological change. A common factor for everyday business is uncertainty, which is defined by Geissler and Krys (2013) as an individual’s or organization’s inability to predict something accurately. Managers face uncertainty in the overall business environment comprised of macroeconomic, political, social, environmental and technological components in which they operate in. In the Communist Manifesto, Karl Marx and Friedrich Engels point out that the distinction of running an organization in the current times will be characterized by “constant revolutionizing of production, everlasting agitation and uncertainty and uninterrupted disturbance of social conditions” (Marx and Engels, 1969). Consequentially, organizations cannot afford to ignore the crucial part that uncertainty plays in the management of businesses.

As Geissler and Krys (2013) demonstrate, the underestimation of uncertainty can be dangerous. On one hand ignoring uncertainty can lead to strategies which are unable to safeguard the company against threats, and on the other hand leads to strategies that ignore the possible opportunities that are made possible by uncertainty developments. An example of how dire a lack of response to uncertainty can be is where Western Union in the 1870s,
wrongly predicted that the telephone was incapable of replacing the telegraph due to its many shortcomings to be considered as a viable means of communication. Today, the number of cell phone subscriptions alone stand at about six billion (Rosenberg, 2007). The innovation process that leads to technological change is riddled with a high level of uncertainty, and it comes as no surprise that many innovating firms have experienced high failure rates. Rosenberg (2007) points out that more to this high rate of failure, firms are unable to accurately predict the level of impact the technologies will have on society and what they will ultimately morph into to produce positive results as was demonstrated by the Western Union case. With the high levels of uncertainty in the environment, Giessler and Krys (2013), clinging on to dogmas and treading the beaten path will ensure firms do not get the right answers to customers’ problems.

Uncertainty is characterized by three components which are volatility, complexity and ambiguity (Giessler & Krys, 2013). Volatility comprises of firm-level volatility and aggregate volatility. Firm level volatility refers to the changes in a company’s human resource, earnings sales, capital expenditure and price of raw materials. Aggregate volatility refers to large changes in the macroeconomic indicators such as GDP growth on a national, regional or global scale. Rosenberg (2007) adds that fast spread of new technology causes a high degree of volatility which firms are forced to react to by initiating strategic maneuvers. It can thus be seen that volatility will require strategic responses by firms in order for them to stay abreast. Snowden and Boone (2007) define complex systems as those which can experience minor impacts that can produce disproportionately major consequences and where history does not lead to helpful implications for the future as external conditions are extremely dynamic. Complexity thus results from firms having to navigate a growing number of factors when creating strategy, where network effects and change in different levels making the task even more daunting. The last component of uncertainty is ambiguity, which brings across the lack of clear variables involved while making a decision, and how precise their role is (Giessler & Krys, 2013). The technology industry is particularly affected by uncertainty, as increasingly different industries are becoming more and more interconnected with a minor change in one sector will have an effect on the industry. Competition is not only coming from those within the industry but also from those without.
The greatest difficulty for technology companies in view of uncertainty is mostly due to the fact that technologies are created in a very primitive condition as Rosenberg (2007) points out. This is because their ultimate uses are derived from a continual improvement process which greatly expands their practical applications. The study then concludes that failure in firms is due to the inability to anticipate the trajectory of future improvements and the economic consequences of the improvements thereof. Giessler and Krys (2013) also point to this by stating that the incorrect nature of predicting the potential of a technology riddles the strategic moves a firm make. So far, it can be seen that uncertainty plays a role in technological change that goes beyond uncertainty associated with technology feasibility alone (Rosenberg, 2007). Along any dimension of uncertainty, decision making lacks the access to an even marginally informative probability distribution with respect to potential outcomes, requiring strategies that will enable firms make the most of uncertainties in the environment.

2.3.1 Strategic Responses to Uncertainty

A consistent theme in literature on improvement of technology is innovation, whether on a small scale or of big bang proportions (Christensen, Raynor & McDonald, 2015; Elg, 2014; Lu & Marjot, 2008; Sood & Tellis, 2015). So what is entailed in innovation? According to Elg (2014; p.14), innovation can be described as the “process of developing a new product, method or service that provides added value to its users, by provision of a function[s] that is better and/or cheaper than previous options. “ To explicate further, it can be defined as the, “implementation of a new or significantly new marketing methods or new ways of organizing business work organization or external relations.” According to Dasgupta, Sahay and Gupta (2009), innovation, or the newness of an idea can comprise of both technological innovation (new technologies, products, and services) and administrative innovations (new procedures, policies and organizational forms). As a result, innovations are not just new technological products or processes, but also organizational innovations, new business models and distribution channels.
Though innovation cannot be limited to products as is the case in tech industries, it is evident from Elg (2014) that tech companies require a significant amount of R&D in order to stay abreast with the constant innovations that come forth in their industry. Production in these companies are often an input into other industries, with demands of making their processes and products cheaper or of high value to the end customer. As a result, these companies seek to drive innovation through the hiring of scientists, engineers and highly qualified technicians into the labor force. New technologies are not normally formed as rare flashes of genius, but are based on acquiring new ways of combining existing building blocks. The further away from an incumbent technology an innovation is, the more radical an innovation is considered. An example would be the jet engine, which has nothing in common with the piston engine other than its purpose, however it builds its core from other existing fields of similar application (Elg, 2014).

Research and development plays a critical role in the innovation process. It’s essentially an investment in technology and future capabilities which is transformed into new products, processes, and services. In industry and technology sectors R&D is a crucial component of innovation and a key factor in developing new competitive advantages (Dasgupta, Sahay and Gupta, 2009). One company in particular has devoted itself to R&D and as a result has constantly managed to stay ahead of its competition Intel has managed to regularly stay abreast in its industry largely in part due to their R&D investment, which has ensured a never ending ability in producing new and better products which other firms are unable to imitate.

The major ingredients of innovation are knowledge, and technology. R&D directly supports the development of both of these factors, which is worth considering due to the importance of continual transformation in step with the business environment. It is important to note however, according to Elg (2014), although research based competencies can contribute to the technological innovation process in many ways, they are not the only sources for new services, processes and products. That being said, he points out that research and development plays an essential strategic role in identifying future threats and opportunities where companies would need to upgrade their competencies in order to be/remain competence.
Elg (2014) describes the relationship between research and innovation as an interaction between two parallel processes and mostly similar goals. In the study, the researcher discovered that the two are mutually inclusive, in that a firm that invests in research and development is highly innovative, while the reverse also holds true. Figure 2.2 serves to elaborate further:

**Figure 2.2: Relationship between Research and Innovation**

![Figure 2.2: Relationship between Research and Innovation](image)

**Source:** Adapted from Elg (2014), Vinnova, p. 35.

According to Dasgupta, Sahay and Gupta (2009), it is the R&D function which provides a platform for innovation and creativity to flourish in an organization. As is stated in “Research and Development” (2016):

*All the modern inventions – laptops, palmtops, music players, iPods, MP3 Players, automatic washing machines, dishwashers, water filters are all examples of R&D efforts that had a successful outcome. The world moves on only through scientific inventions and discoveries which are result of sustained R&D effort. Only this leads to long term business sustainability. Sometimes R&D efforts are also necessitated to meet the regulatory norms eg: green technologies that reduce pollution. Hybrid cars, electric cars, catalytic converters in cars are examples of successful R&D efforts.*
When a firm spends its resources on research and development, they manage to acquire a significant amount of knowledge. However it is important to note that R&D success depends on the useful knowledge that the company can use to further develop its main product lines, and as a result increased capability in dealing with a technologically turbulent environment. Due to the fact that business exists for profit, time to market of R&D efforts should be shortened, to maximize benefits of the effort. This effort also needs to be scaled up within a reasonable time frame, otherwise little can be attributed to research based competencies that a firm possesses. R&D becomes extremely relevant to make an organization future ready, to equip the business with the wherewithal required for commercialization of lab efforts through large scale production (Dasgupta, Sahay & Gupta, 2009).

2.4. Product Obsolescence and Strategic Response

2.4.1 Short Product Life Cycles

All products in the business world have a finite life cycle, which can be considered from various aspects and can be divided into different categories. The simplest life cycle classification is the product life cycle which traces the path of a product from its beginning to the last phase of its existence from a sales revenue perspective. This varies from industry to industry, but due to the fact that this study is based on the technology industry, it shall be confined to it. The stages of the product life cycle are composed of four stages, namely; introduction, growth, maturity and finally decline. Before a company invests in product development, it has to find out the technology stage in the life cycle. This is because it has to be keen on whether the technology is growing or being replaced by new technology which will drastically reduce their products life span (Shahmaniehatghieh, Tolonen & Haapasalo, 2015). As Christensen (1997) points out, if any technology development leads to a life cycle, then subsequent product life cycles will form around it. Product life cycle is based on individual limited series of products while technology life cycle is based on different platforms that can produce various life cycles. It can thus be established that if there are a slew of disruptive technologies, then the technology life cycle and the subsequent product life cycles are drastically reduced.
Technology life cycle stages are comprised of the same stages as PLC, comprised of introduction (emerging), growth, maturity, and decline (saturation) (Lu & Marjot, 2008). Shahmaniehatghieh, Tolonen and Haapasalo, (2015), define each of the following stages in detail. In the introduction/emerging stage, the product developments are fundamental to the definition of technology as opposed to practical ideas for products in the market. The researcher is focused on defining the technology with little push to know of its usefulness, which means that most companies consider it high risk. The uncertainty at this stage is high, like the technology cost, with no derivative product from the technology. During the growth stage, the concept has been defined and applicable products are developed. The risk of investment decreases and the technology is adopted by many companies, as opposed to the previous stage. In the maturity stage, the number of new patents has flattened, and the risk of investment is lowest as it has been proven, with the number of competitors in the space at its highest. In the final stage, patent applications based on the technology decline as well as the level of competitors (Lu & Marjot, 2008).

Figure 2.3: Technology Life Cycle

Source: Adapted from Lu and Marjot (2008)
The S-curve implies that; when a new technology appears, firms with current technologies find it hard to react, incumbent’s technology cannot last forever and attackers (companies with the new technology) possess skills and assets to attract new talent and benefit from a first mover advantage (Shahmaniehatghieh, Tolonen & Haapasalo, 2015).

As was elaborated before, product life cycles in the technology industry are derived from the technology life cycle. This model helps firms in managing their product portfolio by informing when they should launch or retract a product (Lu & Marjot, 2008, Shahmaniehatghieh, Tolonen & Haapasalo, 2015). Like the technology life cycle, the product life cycle comprises of the introduction, growth, maturity and decline stage. In the introduction stage, companies rely heavily on feedback for product environment, while in the growth phase, product is adopted by more customers and the number of competitors increases. In the last two stages of maturity and decline, the firm aims at driving down cost in order to maintain profitability and fight off the inevitable death of the product (Shahmaniehatghieh, Tolonen & Haapasalo, 2015, Lu & Marjot 2008).

Hofer (1975) points out that there is a highly important role played by product life cycles in making strategic decisions, as was demonstrated by a study which studied the influences of PLC on business strategies. Additionally, the study found that introduction, maturity and decline as the ideal points for strategy renovation in any product life cycle (Shahmaniehatghieh, Tolonen & Haapasalo, 2015). Lu and Marjot (2008), point out that due to growing competition amongst companies, there is a great reduction of product life cycles fueled by rapid diffusion of creations and innovations. In order to ensure survival, firms need to be in a place where they can either create or maintain their competitive advantage.

In the same breadth, various studies have found that it is becoming increasingly problematic to release a product out to market before it becomes rendered outdated (Lu & Marjot, 2008; Wu, Aytec, Berger & Ambuster, 2007; Geissler & Krys, 2013). In the recent past, there have been a number of new competitors and technologies which are pushing firms all over the world to create products faster which has in turn led to increasingly shorter product life cycles. Products that were once in high demand lose market fast, albeit their practicality
mostly because they are not state of the art. This would then lead to their death due to the influx of new products in the market. To add to this dilemma, firms do not have the freedom to research on the feasibility of a product for years before manufacturing because if too much time is taken to reach this decision, they will have been overtaken at the point of introduction to the market. Wu, Aytec, Berger and Ambuster (2007), argue that this phenomenon plagues organizations which have a technological bent, as shown by a study done by Battelle Laboratories. Firms which are in the technology industry or dependent on it as a core competence, face the pressure of their products becoming obsolete faster with short life cycles upon release and the need to develop new or better products.

It is important to note, that not all industries suffer from these pressures. An example of this would be the industry of tires and furniture, which are comprised of the same basic technology that was in place fifty years ago. Their level of turbulence can be seen as one that is repetitive and as such would not have to deal with the threat of short product life cycles in business. However, in the technology industry, consumers drive the production of numerous products which results in rapid death of incumbent products. Shorter product life cycles are most visible in the consumer market, but it also does affect industrial products such as semiconductors, robotics and computers, just to mention but a few (Lovas, 2014).

It is also noted that firms are able to produce new goods faster due to the technology made available to them to allow for business analysis, which points to the increasing burden of technology firms to keep getting better in a bid to ensure the end user can cope with the ever changing demands of the environment they operate in. Thus, Lu and Marjot (2008) conclude that the issue of short product life cycles trickle down to almost every industry, except for those who offer commodities such as grains or ores. However, there is sentiment that products can always be improved and would not necessarily stay the same over a series of years. This then points to the idea that change is key and essential to all businesses across different industries. It is also noted that the level of uncertainty which firms have to deal with are different in different industries and thus would present different challenges for the respective firm. A company operating in the furniture industry for example, would have an easier time on predicting and producing new goods and services as opposed to a firm in the technology industry.
As is further noted by Shahmaniehatghieh, Tolonen and Haapasalo (2015), tech products are rather challenging to manage due to the rapid rate of innovation which consequently causes shorter product life cycles and ultimately product obsolescence. It is further noted that to consolidate the customer base and gain new customers, a firm must innovate and provide quality service. This pressure to innovate in order to maintain a competitive edge further deteriorates the product life cycle in the technology industry.

2.4.2 Strategic Response to Short Product Life Cycles

In the words of Drucker, “There are no longer competitors, just better solutions and more choices that can be put together in more ways. Companies focused on competitors are focused on the past, not a future full of technological and demographic opportunities” (Edersheim, 2007; p. 35; Sasaka, 2016). With the acceleration of global businesses and clients becoming more sophisticated and demanding, firms find themselves in a tumultuous and dynamic environment that requires them to respond decisively and adequately. Strategic alliances are thus increasingly seen as a response to increasingly shorter product life cycles, through pooling the capabilities and strengths of different parties to achieve set goals (Lu & Marjot, 2008).

Lovas dissects strategic alliance in a bid to define the term. “Strategic implies planning and directing forces with a long term view, while an alliance is a relation or union between two or more business entities where the complementary strengths create more value for the customer than derived independently (Lovas, 2014; p.1). Porter (1990) defines a strategic alliance as a long term agreement between firms which go past normal market transactions but fall short of a merger. From this we can gather that strategic alliances are agreements between independent firms, aimed at acquiring a competitive advantage.

There are many types of strategic alliances that are in existence today. They can take shape in the form of contracts, limited partnerships, corporate joint ventures or less formal referral networks. Cojohari (2010) points out that strategic alliances take three major forms; trading, functional or dynamic alliances. In a trading alliance, the arrangement is straightforward and is based on contractual terms. Functional alliances integrate basic functions between the two parties by bringing resources in a bid to attain certain goals and establish relationships. They
are usually used to pursue research and development projects, provide geographical market access, share costs and drive sales activities. In a dynamic alliance, an arrangement is made between the parties where certain hidden assets such as skills, knowledge and capacity are involved in order to deliver results. Such assets would comprise of R&D capabilities, market based acceptance, proprietary technology and organizational strength among others (Cojohari, 2010).

The factors leading to strategic alliances has been varying over the years, from improving product performance to the present drive for enhanced capabilities and competencies. Due to the continual disruption in the technology industry, firms are forced to have a constant flow of innovation, access to new opportunities, anticipate rival’s moves, reduction of total cost and acquisition of advantages in responding to emerging opportunities and changing conditions (Baranov, 2013). According to studies, strategic alliances are widespread in the tech industry, and more specifically in the high-tech industry due to a couple of reasons. A particular importance of strategic alliances, is the need for synergy among organizations with differing competencies as a result of the need for convergent technologies and markets. When different firms come together, they have the opportunity to pool resources and thus cut on cost and time to market (Klincewicz, 2005). Alliances are formed more likely than not to create products, which would then be a success if they are adopted as standards in their respective industries which would serve to explain horizontal alliances among competitors, uniting forces in pursuing high risk areas of great opportunity. One can then conclude that alliances are motivated by the fact that knowledge and resources are asymmetrical, particularly true for high-tech sectors, offering mutual benefits of access to market and unique technologies (Isoraite, 2009).
2.5 Chapter Summary
The chapter has provided a review of literature guided by the research questions. The literature helped the researcher come up with appropriate research methodology in the next chapter. The chapter has been completed on the basis of the research questions; to what extent does disruption lead to strategic response, to what extent does uncertainty lead to strategic response and what is the effect of short product life cycles on strategic responses. Chapter three will cover research methodology.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter will provide a discussion on the methodology that will be used in the study. It will discuss the choice of the design of research which will be utilized throughout the study. It will also aim to show the population of the study, the sample and sampling technique, data collection methods, data analysis as well as the method that will be used to present the data.

3.2 Research Design

Cooper and Schindler (2008), define research design as a plan and structure of investigation created to acquire answers to research objectives or questions. The description of Burns and Grove (2003), depicts research design as a blueprint of steering a study, with a great amount of control over the factors that can have an effect on the study and consequently interfere with the validity of the findings. However, Creswell (2009) shows that research design is not merely a work plan, as the plan will flow from the research design of the project. He goes on to expound that, “the function of a research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible” (Creswell, 2009: 9). He concludes that research design deals with a logical and not a logistical problem. The research design that will be utilized in this study will be the descriptive research design.

Albeit some people dismiss this form of research design as mere description, good descriptive research is fundamental to the research endeavor and has contributed greatly to the knowledge of society as a whole. Descriptive research can take a concrete or abstract form, where in concrete form, the researcher aims to look at the ethnic mix in Kenya, and in the abstract form, the researcher asks questions like ‘Is the level of social inequality increasing or decreasing?’ (Creswell, 2007). The advantage of using a descriptive research design is that the data can be readily available through the use of surveys, and can thus prove to be relatively inexpensive in comparison to causal research design, which is due to the fact that it seeks to answer the question of ‘what’ as opposed to ‘how, when and why’ (Shields & Rangarajan, 2013). Moreover, it provides a basis for the ‘why’ questions that are explored in
explanatory research (Creswell, 2007). Disadvantages of this approach are that the correlation between the causes and effects may be unclear leading to wrong conclusions as well as mindless data gathering that fails to provoke ‘why’ questions (Shields & Rangarajan, 2013).

Employing this research design, the researcher will conduct a survey on the sample derived from the population of choice, namely employees of IBM Africa. The independent variable being tested is technological turbulence comprised of disruption, uncertainty and product obsolescence, while the dependent variable will be strategic responses represented by skill development, research and development, knowledge creation and strategic alliances. The strategic responses represent the devices a company would employ in dealing with technological turbulence.

3.3 Population and Sampling Design

3.3.1 Population

According to Cooper and Schindler, (2008), a population is the total collection of elements, from which a measure will be taken in a bid to make derive insight and inferences. The population of this study will comprise of senior management, first and second level management, as well as non-management staff of the firm. The company in focus will be IBM Africa, which is comprised of roughly 800 employees. The sample shall be on the basis of the level of seniority within the company and is represented as follows:

Table 3.1: Population Size

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Management</td>
<td>50</td>
<td>6.25%</td>
</tr>
<tr>
<td>Second Level Managers</td>
<td>100</td>
<td>12.5%</td>
</tr>
<tr>
<td>First Level Managers</td>
<td>150</td>
<td>18.75%</td>
</tr>
<tr>
<td>Non-management staff</td>
<td>500</td>
<td>62.5%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>800</td>
<td>100%</td>
</tr>
</tbody>
</table>
3.3.2 Sampling Design

A sample design is described as the means by which one selects the primary elements of data selection and analysis appropriately for research questions (Creswell, 2007).

3.3.2.1 Sampling Frame

Smith, Ferrier and Ndofor (2001) describe a sampling frame as the source material of device from which a sample is drawn. According to Coopers and Schindler, (2000), a sampling frame is the list of elements from which the sample is drawn. This subgroup, known as the sample, is carefully selected so as to be representative of the whole population with the relevant characteristics. Each member or case in the sample is referred to as subject, respondent or interviewees. The sampling frame for this study will be a list of all the current employees of IBM Africa across business units, which will be obtained from the enablement specialists in each business unit in scope. The list will constitute of employees who will be categorized into senior level management, middle level management and non-management staff.

3.3.2.2 Sampling Technique

Sampling is a procedure, process or technique of choosing a sub-group from a population to participate in the study (Ogula, 2005). It is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the large group from which they were selected. The sampling technique that will be employed in this study will be the stratified sampling technique. Mugenda and Mugenda (1999) define this technique as a process of dividing members of a population into homogenous subgroups before sampling. The strata should be mutually exclusive, where the elements in the population are assigned to one stratum. The population will be segmented on level of seniority and role description, as each of these differ from the other in terms of responsibilities and nature of work. That is a researcher employed into the organization will have a different experience in comparison to a seller who directly interacts with the customers.
3.3.2.3 Sample Size

Mugenda and Mugenda (1999) state that a sample size is the number of cases or individuals in the population studied which is denoted by ‘n’. The sample size for this research study was based on the list provided by the enablement specialist from each department which will serve as a representation of the entire population of IBM Africa. Cooper and Schindler (2014) define a sample size as a set of variables from which data are collected. It serves to enable a researcher to plan his research in good time and assess the financial implications before embarking on the research. The table below represents the sample size that was utilized in performing the research.

Table 3.2: Sample Size from the Population

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Management</td>
<td>10</td>
<td>9.5%</td>
</tr>
<tr>
<td>Second Level Managers</td>
<td>10</td>
<td>9.5%</td>
</tr>
<tr>
<td>First Level Managers</td>
<td>30</td>
<td>28.6%</td>
</tr>
<tr>
<td>Non-management staff</td>
<td>55</td>
<td>52.4%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>105</td>
<td>100%</td>
</tr>
</tbody>
</table>

3.4 Data Collection Method

Before commencement of data collection, the researcher obtained all the necessary documents inclusive of an introductory letter from the university. The researcher also sought audience with the human resource and legal teams of the selected business units to acquire access to the participants required to acquire the primary data needed to answer the research objectives of the study. A structured questionnaire was the adopted tool for collecting the required information. The questions asked in the questionnaires were based on the research questions that were raised in the first chapter. The questionnaires were used to capture specific information from the respondents. This method was of great advantage as it provided immediate feedback and clarification on the questions asked to the respondents. The
questions were both closed and open ended. It was made up of four parts; respondents’ background information, level of disruption, level of uncertainty, extent of short product life cycles in the technological environment as well as strategic responses. Upon getting clearance, the researcher distributed the questionnaires to the sampled individuals in the selected business units being studied. Use of questionnaires was expected to ease the process of data collection as all the selected respondents were reached in time. During the distribution of the instruments, the purpose of the research was explained.

3.5 Research Procedure

A pre-test of the questionnaire was undertaken to certify that the questions will be effective for data collection. A pre-test was carried out using a strategic management professor and later on with three employees of IBM. The feedback collected was based on the quality of the questionnaire, length of the questionnaire, time taken to fill in the questionnaire, clarity of questions and relevance of the questions to the organization. The method that was employed to distribute the questionnaires was to engage the sampled individuals and personally ask them to take some time to fill out the questions enumerated on the tool. After the respondent spent five days with the tool to ensure adequate time to respond, the researcher went ahead to collect the questionnaires.

3.6 Data Analysis Technique

Both quantitative and qualitative approaches were used for data analysis. Quantitative data from the questionnaire will be coded and entered into the computer for computation of descriptive statistics. The Statistical Package for Social Sciences (SPSS version 22) was used to run descriptive statistics such as frequency and percentages so as to present the quantitative data in form of tables and graphs based on the major research questions. The qualitative data generated from open ended questions will be categorized in themes in accordance with research objectives and reported in narrative form along with quantitative presentation. Measures of dependency which are correlation and covariance were applied (Munyi, 2014). A regression analysis was also carried out to determine the extent to which aspects of technological turbulence affect the level of strategic response. After analysis, the data was presented in the form of tables, figures and a regression equation.
3.7 Chapter Summary
The chapter has described the methodology that will be used in carrying out the research study. The research design will be descriptive in nature focusing on technology companies operating in East Africa. The population, sample size, sampling technique and questionnaire as a primary data collection tool were described. The questionnaire will be developed and pilot tested before a refined one is administered to the respondents. The chapter has also indicated that data will be analyzed using SPSS and then illustrated in forms of tables and figures.
CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction
This chapter presents the results and findings of the study of the research questions with respect to the data information collected from the respondents. The chapter begins with the analysis and reports on general information with respect to the respondents; consequently second part looks on the reports of the extent disruption leads to strategic response, the third part covers on the analysis of the extent uncertainty leads to strategic response, the fourth part covers the analysis and report of the extent to which obsolescence leads to strategic response, the fifth section covers the analysis and report of strategic responses while the final section presents the regression analysis.

4.2 General information
Research was done to investigate the general information of the respondents based on the gender, age, job role and position in IBM, level of education, duration of experience in the technology industry and the business unit the respondent worked for.

4.2.1: Response Rate
To depict the number of respondents who participated in the study, Table 4.1 was utilized. Out of the table it is seen that from a population of 105 employees of IBM, 72 responded registering a response rate of 69%. This shows that a significant number of the sample participated in the study.

Table 4.1: Response Rate

<table>
<thead>
<tr>
<th>Sample</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responded</td>
<td>72</td>
<td>69%</td>
</tr>
<tr>
<td>Did not respond</td>
<td>33</td>
<td>31%</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>100%</td>
</tr>
</tbody>
</table>
4.2.2 Gender
From the general information provided by the respondents based on gender, it was found that 72.2% were males while 27.8% were females. Thus the majority (72.2%) of the respondents were males as shown in figure 4.1 below.

![Figure 4.1: Gender](image)

4.2.3. Age
The general information provided by the respondents based on age showed that 8.3% were of age 21-25 years, 27.8% were of age 26-30 years, 22.2% were of age 31-35 years of age, 11.1% were of age 36-40 years, 12.5% were of age 41-45 years and 18.1% were over 45 years of age. Thus the majority (27.8%) of the respondents were of age 26-30 years as shown in figure 4.2 below.

![Figure 4.2: Age](image)
4.2.4 Current Job Category
The respondents provided information indicating their current job roles and it was found that 5.6% were administrative supporters, 1.4% were in business controls, 18.1% were in consultancy, 8.3% were in finance, 8.3% were in human resources, 2.8% were in the legal department, 5.6% were Marketers, 4.2% were in the procurement, 6.9% were in the research and development, 13.9% were in sales and 25% were technical professionals. Thus the majority (25%) were technicians as shown in the figure 4.3 below. The wide array of job categories would serve to provide well corroborated data through the examination of respondents from diverse job categories.

Figure 4.3: Current Job Category

4.2.5 Position in IBM
The respondents were asked to indicate their position in IBM, and it was found that 15.3% were first line managers, 9.7% were middle level managers, 70.8% were non-management staff and 4.2% were in senior management. The low number of managers in comparison to general staff serves to explain the disparity between management and non-management staff.
The diverse source of responses helped in bringing the questions to perspective as far as technological turbulence and strategic responses are concerned in different levels of the organization. However as was expected due to the ratio of management and non-management staff, the majority were non-management staff as shown in the figure 4.4 below.

**Figure 4.4: Position in IBM**

4.2.6 Level of Education

The respondents were asked to provide information on their level of education and it was found that 41.7% had bachelor’s degree as their highest level of education, 9.7% had college diploma as their highest level of education, 8.3% had doctoral degree as the highest level of education. 1.4% of the sample reported that they had earned a high school diploma as the highest level of education and 38.9% had master’s degree as the highest level of education. Thus the majority (41.7%) of the respondents had a bachelor’s degree as the highest level of education as shown in the Table 4.2.
Table 4.2: Highest level of education

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor’s degree</td>
<td>30</td>
<td>41.7%</td>
</tr>
<tr>
<td>College diploma</td>
<td>7</td>
<td>9.7%</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>6</td>
<td>8.3%</td>
</tr>
<tr>
<td>High school diploma</td>
<td>1</td>
<td>1.4%</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>28</td>
<td>38.9%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

4.2.7 Experience in Technology

To add more insight to the study, it was important to know for how long the respondents have worked in the technology industry, as experience informs knowledge in the respective areas concerned. The general information provided by the respondents based on experience in technology industry showed that 37.5% had 1-5 years of experience, 12.5% had 11-15 years of experience, 8.3% had 16-20 years of experience, 25% had 6-10 years of experience, 2.8% had below one year of experience and 13.9% had more than 20 years of experience.

Thus the majority (37.5%) of the respondents had 1-5 years of experience, followed by 25% of the sample who cited to have had between 6-10 years of experience in the technology industry as shown in figure 4.5 below.

Figure 4.5: Experience in Technology Industry
4.2.8. Years of experience with IBM

It also was important to gain insight as to how long the respondents have worked with IBM, as with this information the researcher can be able to gauge how much the sample has interacted with the organization. The general information provided by the respondents based on experience with IBM showed that 56.9% had 1-4 years of experience, 15.3% had 5-8 years of experience, 1.4% had 9-12 years of experience, 13.9% had less than one year of experience and 12.5% had more than 12 years of experience.

Thus the majority (56.9%) of the respondents had 1-4 years of experience as shown in table 4.3 below.

<table>
<thead>
<tr>
<th>Years Worked in IBM</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4 years</td>
<td>41</td>
<td>56.9%</td>
</tr>
<tr>
<td>5-8 years</td>
<td>11</td>
<td>15.3%</td>
</tr>
<tr>
<td>9-12 years</td>
<td>1</td>
<td>1.4%</td>
</tr>
<tr>
<td>Less than a year</td>
<td>10</td>
<td>13.9%</td>
</tr>
<tr>
<td>More than 12 years</td>
<td>9</td>
<td>12.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

4.2.9 Business Units

Different business units face unique challenges, and as a result it was imperative for the researcher to glean information from the respondents on which business unit each works in. This knowledge would inform the study as to how each unit perceives technological change and subsequent strategic response. The respondents were asked to name the business units they work for and the following units were named, 2.8% named Analytics, 2.8% named cloud, 2.8% named cognitive solutions, 18.1% named GBS, 22.2% named GTS, 9.7% named research, 4.2% named security, 1.4% named systems HW and 20.8% supporting other business units. Figure 4.7 highlights the results that have been pointed out above.
4.2.10. Description of the Business Environment

The respondents were asked to describe the business environment where their business units operate and the following were the descriptions. Changing: Fast incremental change with a predictable future in which 34.7% of the respondents were for such a description. 19.4% described the environment as discontinuous, where there is discontinuous predictable change with a partially predictable future. 20.8% described the environment as expanding, where they believed that there was slow incremental change and an extrapolatable future. Finally the study found that 8.3% of the sample described the environment as repetitive, where no change is occurring, while 16.7% described the environment as surpriseful. It is important to note that all the respondents who held doctoral degrees, described the environment as surpriseful. While the majority of the population (37.4%) described the environment as one with fast incremental change. This reinforced that the environment in which they are in is not stable but one that is characterized by various forms of change. Figure 4.8 depicts the results in the form of a chart.

Figure 4.6: Business Units Represented
4.3 Disruption and Strategic Response

4.3.1 New Technology as a Form of Disruption
Disruption is largely brought about by new technologies or new business models. In the technology world, disruption occurs through the introduction of new technology or way of delivering services (business models). Therefore the study aimed to test the issue around new technology and its prevalence in the industry IBM operates in.

The researcher sought to investigate the opinion that many companies in the industry are abandoning traditional business to focus on emerging technology. It was found that 4.2% disagreed and strongly disagreed with the opinion, 84.7% agreed and strongly agreed with the opinion and 11.1% were neutral about the opinion. Thus the majority (84.7%) agreed and strongly agreed with the opinion as shown in the table 4.8 below. It is thus apparent the industry in question constitutes of many companies which shift to emerging technology in order to survive.

The study also sought to investigate the opinion that core strengths of companies have been wiped out in the recent past in the industry. It was found that 15.3% disagreed and strongly disagreed with the opinion, 58.3% agreed and strongly agreed with the opinion and 26.4%
were neutral about the opinion. Thus the majority (58.3%) agreed and strongly agreed with the opinion as shown in the table 4.4 below. This reinforces the idea that there is constant change and in a manner which changes the key success factors in an industry, which is a clear indication of disruption.

The researcher asked the sample whether the success factors which firms compete on have changed drastically in the recent past. It was found that 6.9% disagreed and strongly disagreed with the opinion, 83.3% agreed and strongly agreed with the opinion and 9.7% were neutral about the opinion. Thus the majority (83.3%) agreed and strongly agreed with the opinion as shown in the table 4.4 below. Moreover, the study also investigated the opinion that customers requiring services from the industry are now using greatly advanced technology they were not using three years ago. It was found that 2.8% disagreed and strongly disagreed with the opinion, 93.1% agreed and strongly agreed with the opinion and 9.7% were neutral about the opinion. Thus the majority (93.1%) agreed and strongly agreed with the opinion as shown in the table 4.8 below. The findings above show that the success factors that companies use to compete on face a serious threat of disruption and cannot survive on what they excelled at in the past. Customers as well appear to use greatly advanced technology as a result of radical or incremental introductions of technology.

Finally in the section of new technology, the study sought to investigate the opinion that new technologies increasingly outperform current technology. It was found that 4.2% disagreed and strongly disagreed with the opinion, 70.8% agreed and strongly agreed with the opinion and 25% were neutral about the opinion. Thus the majority (70.8%) agreed and strongly agreed with the opinion as shown in table 4.4 below. When a new technology increasingly outperforms what is already in place, a disruption begins to occur, dependent on the usability of the technology. In this case, the researcher concluded that new technologies are common place in the industry, which is indicative of disruption.
Table 4.4. New technology as a Form of Disruption

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many companies in the industry are abandoning traditional business to focus on emerging technology</td>
<td>0%</td>
<td>4.2%</td>
<td>11.1%</td>
<td>51.4%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Core strengths of companies have been wiped out in the recent past in the industry</td>
<td>1.4%</td>
<td>13.9%</td>
<td>26.4%</td>
<td>38.9%</td>
<td>19.4%</td>
</tr>
<tr>
<td>In our industry, success factors which firms compete on have changed drastically in the recent past</td>
<td>1.4%</td>
<td>5.6%</td>
<td>9.7%</td>
<td>47.2%</td>
<td>36.1%</td>
</tr>
<tr>
<td>Customers requiring services from the industry we are in are now using greatly advanced technology they were not using three years ago</td>
<td>0%</td>
<td>2.8%</td>
<td>4.2%</td>
<td>54.2%</td>
<td>38.9%</td>
</tr>
<tr>
<td>New technologies increasingly outperform current technology in the industry we are in</td>
<td>1.4%</td>
<td>2.8%</td>
<td>25%</td>
<td>47.2%</td>
<td>23.6%</td>
</tr>
</tbody>
</table>

4.3.2 Rivalry from Current Competitors as a Form of Disruption

The next section under disruption is the level of rivalry amongst current industry players. The study thus sought to investigate the opinion that current industry players introduce products that would pose a significant threat to technology leaders. It was found that 12.5% disagreed and strongly disagreed with the opinion, 68.1% agreed and strongly agreed with the opinion and 19.4% were neutral about the opinion. Thus the majority (68.1%) agreed and strongly agreed with the opinion as shown in the table 4.5 below.

Study sought to investigate the opinion that many former leading companies in the industry are struggling today. It was found that 13.9% disagreed and strongly disagreed with the opinion, 62.5% agreed and strongly agreed with the opinion and 23.6% were neutral about the opinion. Thus the majority (62.5%) agreed and strongly agreed with the opinion as shown in the table 4.5 below. From the responses, the researcher found that there is intense rivalry among firms in the industry as is demonstrated by the majority of the respondents agreeing to the tested questions.
Table 4.5: Rivalry from current competitors

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current industry players introduce products that would pose a significant threat to technology leaders</td>
<td>1.4%</td>
<td>11.1%</td>
<td>19.4%</td>
<td>54.2%</td>
<td>13.9%</td>
</tr>
<tr>
<td>Many former leading companies in the industry are struggling today</td>
<td>0%</td>
<td>13.9%</td>
<td>23.6%</td>
<td>41.7%</td>
<td>20.8%</td>
</tr>
</tbody>
</table>

4.3.3 Threat from New Entrants as a Form of Disruption

The final section aimed at testing the level of disruption in the business unit is the threat faced by current industry players from new entrants. Research was done to investigate the opinion that new entrants pose a significant threat to companies in the industries. It was found that 13.9% disagreed and strongly disagreed with the opinion, 60.6% agreed and strongly agreed with the opinion and 25% were neutral about the opinion. Thus the majority (60.6%) agreed and strongly agreed with the opinion as shown in the table 4.6 below.

Study sought to investigate the opinion that new players who were not in existence five years ago are leading in our industry today. It was found that 18.1% disagreed and strongly disagreed with the opinion, 59.7% agreed and strongly agreed with the opinion and 22.2% were neutral about the opinion. Thus the majority (59.7%) agreed and strongly agreed with the opinion as shown in the table 4.6 below. The responses from the two questions show that new players pose a significant threat as more than 60% of the sample agreed or strongly agreed to the statements tested.

Table 4.6: Threat from New Entrants

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>New entrants pose a significant threat to companies in the industry we operate in</td>
<td>1.4%</td>
<td>12.5%</td>
<td>25%</td>
<td>30.6%</td>
<td>30.6%</td>
</tr>
<tr>
<td>New players who were not in existence five years ago are leading in our industry today</td>
<td>1.4%</td>
<td>16.7%</td>
<td>22.2%</td>
<td>44.4%</td>
<td>15.3%</td>
</tr>
</tbody>
</table>
4.3.4. Correlation Test between Disruption and Strategic Response

A Pearson correlations test was done to investigate the relationship between the three components disruptions and the four components of the strategic response. The three components of disruptions were new technology, rivalry from current competitors and threat from new entrants while the four components of strategic response were knowledge creation, research development, skill development and partnership. The analysis showed that there was a statistical positive significant relationship between knowledge creation and new technology at 0.05 level of significance with $r=0.236$ and $p=0.046$, Research and development and new technology at 0.05 level of significance with $r=0.290$ and $p=0.014$, and finally partnership and new technology at 0.05 level of significance with $r=0.233$ and $p=0.049$. The analysis also proved that there is no significant relationship between new technology and skill development, while rivalry from current competitors and threat from new entrants did not correlate with any component of strategic response shown in the table 4.7 below.

**Table 4.7: Correlation between Disruption and Strategic Response**

<table>
<thead>
<tr>
<th></th>
<th>New Technology</th>
<th>Rivalry from current competitors</th>
<th>Threat from new entrants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge Creation</strong></td>
<td>Pearson Correlation</td>
<td>.236$^*$</td>
<td>.008</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.046</td>
<td>.949</td>
</tr>
<tr>
<td><strong>Research and Development</strong></td>
<td>Pearson Correlation</td>
<td>.290$^*$</td>
<td>.166</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.014</td>
<td>.163</td>
</tr>
<tr>
<td><strong>Skill Development</strong></td>
<td>Pearson Correlation</td>
<td>.167</td>
<td>-.007</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.161</td>
<td>.953</td>
</tr>
<tr>
<td><strong>Partnership</strong></td>
<td>Pearson Correlation</td>
<td>.233$^*$</td>
<td>.055</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.049</td>
<td>.645</td>
</tr>
</tbody>
</table>
4.4 Uncertainty and Strategic Response
4.4.1 Complexity as a Form of Uncertainty

One way to determine how uncertain an environment is through the examination of how complex the respondents perceived their technological environment is. The study therefore arrived at the complexity of the environment by surveying the following questions. This section sought to investigate the opinion that industries are intimately connected. It was found that 95.8% agreed and strongly agreed with the opinion and 4.2% were neutral about the opinion. Thus the majority (95.8%) agreed and strongly agreed with the opinion as shown in the table 4.8 below. This representation affirms that the respondents strongly agreed that the industry they are in is complex as a result of the intimate interlinkages with other industries.

The study also sought to examine the opinion that there are macroeconomic changes on a global or regional scale which greatly affect industries. It was found that 2.8% disagreed and strongly disagreed with the opinion, 83.3% agreed and strongly agreed with the opinion and 13.9% were neutral about the opinion. Thus the majority (83.3%) agreed and strongly agreed with the opinion as shown in the table 4.8 below.

Study sought to investigate the opinion that competition is not only from within, but also from outside the industries. It was found that 2.8% disagreed and strongly disagreed with the opinion, 93.1% agreed and strongly agreed with the opinion and 4.2% were neutral about the opinion. Thus the majority (93.1%) agreed and strongly agreed with the opinion as shown in the table 4.8 below. From this analysis, the researcher concluded that the respondents operate in a highly complex environment as demonstrated by the strong results of agreement as far as the areas surveyed were concerned.
Table 4.8: Level of Complexity

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The industry we are in is intimately connected with other industries</td>
<td>0%</td>
<td>0%</td>
<td>4.20%</td>
<td>44.40%</td>
<td>51.40%</td>
</tr>
<tr>
<td>There are macroeconomic changes on a global or regional scale which greatly affect our industry</td>
<td>0%</td>
<td>2.80%</td>
<td>13.90%</td>
<td>44.40%</td>
<td>38.90%</td>
</tr>
<tr>
<td>Competition is not only from within, but also from outside our industry</td>
<td>0%</td>
<td>2.80%</td>
<td>4.20%</td>
<td>40.30%</td>
<td>52.80%</td>
</tr>
</tbody>
</table>

4.4.2 Ambiguity as a Form of Uncertainty

In order to further determine the level of uncertainty, the researcher sought to examine the level of ambiguity in the environment which IBM operates in. The study therefore aimed at investigating the opinion that companies frequently change strategies to adopt new technology. It was found that 6.9% disagreed and strongly disagreed with the opinion, 83.3% agreed and strongly agreed with the opinion and 9.7% were neutral about the opinion. Thus the majority (83.3%) agreed and strongly agreed with the opinion as shown in the table 4.9 below.

Furthermore the study sought to investigate the opinion that the impact of product introduction by any players in the industry is normally ambiguous. It was found that 23.6% disagreed and strongly disagreed with the opinion, 43.1% agreed and strongly agreed with the opinion and 33.3% were neutral about the opinion. Thus the majority (43.1%) agreed and strongly agreed with the opinion as shown in the table 4.9 below.

The last area that sought to determine the level of ambiguity in the industry that IBM operates in was the issue of management. The study sought investigated the opinion that managers in the industry cannot accurately predict success/failure of a product. It was found that 30.6% disagreed and strongly disagreed with the opinion, 41.6% agreed and strongly agreed with the opinion and 27.8% were neutral about the opinion. Thus the majority (41.6%) agreed and strongly agreed with the opinion as shown in the table 4.9 below.

According to the results, it seems to point to a high level of ambiguity in the industry in which IBM operates in, as has been affirmed by the majority of the sample agreeing or strongly agreeing to the questions posed to them.
Table 4.9: Level of Ambiguity

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of a product during the development stage, will not be identical with its use at the time of commercialization</td>
<td>0%</td>
<td>11.1%</td>
<td>27.8%</td>
<td>41.7%</td>
<td>19.4%</td>
</tr>
<tr>
<td>There is a fast spread of technology in our industry we operate in</td>
<td>0%</td>
<td>1.4%</td>
<td>2.9%</td>
<td>42%</td>
<td>53.6%</td>
</tr>
<tr>
<td>In our industry, minor changes in technology can lead to great changes in market position</td>
<td>1.4%</td>
<td>4.3%</td>
<td>8.7%</td>
<td>42%</td>
<td>43.5%</td>
</tr>
</tbody>
</table>

4.4.3 Volatility as a Form of Uncertainty

The final section that seeks to measure the level of uncertainty in the technology environment that the respondents operate in is volatility. By looking into three questions, the researcher hoped to gain a view of the extent of volatility which would consequently inform how uncertain the technology environment is perceived by the respondents.

The study sought to investigate the opinion that the use of a product during the development stage, will not be identical with its use at the time of commercialization. It was found that 11.1% disagreed and strongly disagreed with the opinion, 61.1% agreed and strongly agreed with the opinion and 27.8% were neutral about the opinion. Thus the majority (61.1%) agreed and strongly agreed with the opinion as shown in the table 4.10 below. The researcher sought to investigate the opinion that there is a fast spread of technology in the industry. It was found that 1.4% disagreed and strongly disagreed with the opinion, 95.6% agreed and strongly agreed with the opinion and 2.9% were neutral about the opinion. Thus the majority (95.6%) agreed and strongly agreed with the opinion as shown in the table 4.10 below.

Study sought to investigate the opinion that minor changes in technology can lead to great changes in market position. It was found that 5.8% disagreed and strongly disagreed with the opinion, 85.5% agreed and strongly agreed with the opinion and 8.7% were neutral about the opinion. Thus the majority (85.5%) agreed and strongly agreed with the opinion as shown in the table 4.10 below.
From the above, the researcher was able to establish that the environment in which IBM operates is highly volatile as affirmed by the agreement of the respondents on the questions measured. More to that in all the elements under uncertainty, namely complexity, ambiguity and volatility, the respondents strongly agreed or agreed with the questions being measured, pointing to the idea that technology environment in which IBM operates is highly uncertain.

### 4.4.4 Correlation Test between Uncertainty and Strategic Response

A Pearson correlations test was done to investigate the relationship between the three components that constitute uncertainty and the four components which make up strategic response. The three components of uncertainty are complexity, ambiguity and volatility while the four components of the strategic response are knowledge creation, research development, skill development and partnership.

The analysis showed that there was a statistical positive significant relationship between skill development and complexity at 0.05 level of significance with $r=0.281$ and $p=0.017$ and also there was a statistical negative significant relationship between research and development and ambiguity at 0.05 level of significance with $r=-0.234$ and $p=0.048$. The analysis also proved that there is no significant relationship between complexity and knowledge creation, complexity and research and development, complexity and partnership, ambiguity and knowledge creation, ambiguity and skill development, ambiguity and partnership. Volatility did not correlate with any component of strategic response as shown in Table 4.11.

### Table 4.10: Extent of Volatility

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Companies in our industry frequently change strategies to adopt new technology</td>
<td>0%</td>
<td>6.9%</td>
<td>9.7%</td>
<td>45.8%</td>
<td>37.5%</td>
</tr>
<tr>
<td>Impact of product introduction by any players in our industry is normally ambiguous</td>
<td>4.2%</td>
<td>19.4%</td>
<td>33.3%</td>
<td>37.5%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Managers in our industry cannot accurately predict success/failure of a product</td>
<td>0%</td>
<td>30.6%</td>
<td>27.8%</td>
<td>31.9%</td>
<td>9.7%</td>
</tr>
</tbody>
</table>
Table 4.1: Correlation between Uncertainty and Strategic Response

<table>
<thead>
<tr>
<th></th>
<th>Complexity</th>
<th>Ambiguity</th>
<th>Volatility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Creation</td>
<td>Pearson Correlation</td>
<td>0.013</td>
<td>-0.072</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.915</td>
<td>0.550</td>
</tr>
<tr>
<td>Research and Development</td>
<td>Pearson Correlation</td>
<td>0.037</td>
<td>-0.234*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.757</td>
<td>0.048</td>
</tr>
<tr>
<td>Skill Development</td>
<td>Pearson Correlation</td>
<td>.281*</td>
<td>-0.129</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.017</td>
<td>0.278</td>
</tr>
<tr>
<td>Partnership</td>
<td>Pearson Correlation</td>
<td>0.094</td>
<td>-0.121</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.432</td>
<td>0.309</td>
</tr>
</tbody>
</table>

4.5 Product Obsolescence and Strategic Response

In order to determine the level of short product life cycles, the researcher sought to examine three areas, namely customer demands, competition and extent of innovation.

4.5.1 Customer Demands as a Driver of Product Obsolescence

The study sought to investigate the opinion that a well performing company is constantly releasing products to maintain a competitive position in our industry. It was found that 19.4% disagreed and strongly disagreed with the opinion, 68.1% agreed and strongly agreed with the opinion and 12.5% were neutral about the opinion. Thus the majority (68.1%) agreed and strongly agreed with the opinion as shown in the table 4.1 below.

The researcher sought to investigate the opinion that customers highly regard companies which constantly release products. It was found that 18.1% disagreed and strongly disagreed with the opinion, 48.6% agreed and strongly agreed with the opinion and 33.3% were neutral about the opinion. Thus the majority (48.6%) agreed and strongly agreed with the opinion as shown in the table 4.12 below.

The final section under customer demands examined the opinion that customers constantly demand for better performing products in their industry. It was found that 1.4% disagreed and strongly disagreed with the opinion, 93.1% agreed and strongly agreed with the opinion and 5.6% were neutral about the opinion. Thus the majority (93.1%) agreed and strongly agreed with the opinion as shown in the table 4.12 below.
It can therefore be established that customers in the industry IBM operates in highly regard the companies which are constantly catering to their constant and changing demands, which drives the life of products to an increasingly shorter life span.

**Table 4.12: Level of Customer Demands**

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A well performing company is constantly releasing products to maintain a competitive position in our industry</td>
<td>0%</td>
<td>19.4%</td>
<td>12.5%</td>
<td>43.1%</td>
<td>25%</td>
</tr>
<tr>
<td>Customers highly regard companies which constantly release products in our industry</td>
<td>1.4%</td>
<td>16.7%</td>
<td>33.3%</td>
<td>34.7%</td>
<td>13.9%</td>
</tr>
<tr>
<td>Customers constantly demand for better performing products in our industry</td>
<td>0%</td>
<td>1.4%</td>
<td>5.6%</td>
<td>30.6%</td>
<td>62.5%</td>
</tr>
</tbody>
</table>

**4.5.2 Competition as a Driver of Product Obsolescence**

The next area under short product life cycles was to determine the level of competition that is perceived by the respondents. The study sought to investigate the opinion that customers constantly demand for better performing products in our industry. It was found that 2.8% disagreed and strongly disagreed with the opinion, 90.2% agreed and strongly agreed with the opinion and 7% were neutral about the opinion. Thus the majority (90.2%) agreed and strongly agreed with the opinion as shown in the table 4.13 below.

The researcher aimed at investigating the opinion that products in the industry do not experience an extended period of dominance. It was found that 21.1% disagreed and strongly disagreed with the opinion, 40.8% agreed and strongly agreed with the opinion and 38% were neutral about the opinion. Thus the majority (40.8%) agreed and strongly agreed with the opinion as shown in the table 4.13 below.

Study sought to investigate the opinion that industries are comprised of many new entrants. It was found that 13.9% disagreed and strongly disagreed with the opinion, 65.3% agreed and strongly agreed with the opinion and 20.8% were neutral about the opinion. Thus the majority (65.3%) agreed and strongly agreed with the opinion as shown in the table 4.13 below.
The researcher wanted to investigate the opinion that numerous products are introduced in the industry annually. It was found that 4.2% disagreed and strongly disagreed with the opinion, 77.8% agreed and strongly agreed with the opinion and 18.1% were neutral about the opinion. Thus the majority (77.8%) agreed and strongly agreed with the opinion as shown in the table 4.13 below.

From this analysis the researcher concluded that there is a high level of competition as depicted by the majority of the respondents strongly agreeing or agreeing to the statements measured on competition. This is clearly depicted in Table 4.13.

Table 4.13: Level of Competition

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The industry we are in experiences a series of rapid innovations on products</td>
<td>0%</td>
<td>2.8%</td>
<td>7%</td>
<td>45.1%</td>
<td>45.1%</td>
</tr>
<tr>
<td>Products in our industry do not experience an extended period of dominance</td>
<td>2.8%</td>
<td>18.3%</td>
<td>38%</td>
<td>33.8%</td>
<td>7%</td>
</tr>
<tr>
<td>Our industry is comprised of many new entrants</td>
<td>0%</td>
<td>13.9%</td>
<td>20.8%</td>
<td>47.2%</td>
<td>18.1%</td>
</tr>
<tr>
<td>Numerous products are introduced in our industry annually</td>
<td>0%</td>
<td>4.2%</td>
<td>18.1%</td>
<td>62.5%</td>
<td>15.3%</td>
</tr>
</tbody>
</table>

4.5.3 Innovation as a Driver of Product Obsolescence

The final section that was aimed at measuring the short product life cycles experienced in the industry in which IBM operates in was innovation. The researcher examined four questions which would determine the overall activity around innovation. The study sought to investigate the opinion that the release of products by any company has to be fast or else they will be beaten by competition.

It was found that 11.1% disagreed and strongly disagreed with the opinion, 75% agreed and strongly agreed with the opinion and 13.9% were neutral about the opinion. Subsequently, the majority (75%) agreed and strongly agreed with the opinion as shown in table 4.14 below. The next question in the study sought to investigate the opinion that the new products in the industry are characterized by incremental changes. It was found that 6.9% disagreed
and strongly disagreed with the opinion, 70.8% agreed and strongly agreed with the opinion and 22.2% were neutral about the opinion. Thus the majority (70.8%) agreed and strongly agreed with the opinion as shown in the table 4.14 below.

Study sought to investigate the opinion that the firms begin innovating on their products soon after release to market. It was found that 2.8% disagreed and strongly disagreed with the opinion, 75% agreed and strongly agreed with the opinion and 22.2% were neutral about the opinion. Thus the majority (75%) agreed and strongly agreed with the opinion as shown in the table 4.14 below.

Study sought to investigate the opinion that the heavy investment in research is required in maintaining a leading position in the industry. It was found that 4.3% disagreed and strongly disagreed with the opinion, 94.2% agreed and strongly agreed with the opinion and 1.4% were neutral about the opinion. Thus the majority (94.2%) agreed and strongly agreed with the opinion as shown in the table 4.14 below.

From the findings on innovation the researcher concluded that there is a high level of innovation in the industry in which the respondents operate in as has been seen and reinforced through the responses in which a majority of the sample agreed and strongly agreed with the statements.

Table 4.14: Level of Innovation

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>In our industry, release of products by any company has to be fast or else it will be beaten by competition</td>
<td>0%</td>
<td>11.1%</td>
<td>13.9%</td>
<td>47.2%</td>
<td>27.8%</td>
</tr>
<tr>
<td>New products in our industry are characterized by incremental changes and uses</td>
<td>0%</td>
<td>6.9%</td>
<td>22.2%</td>
<td>45.8%</td>
<td>25%</td>
</tr>
<tr>
<td>Firms in our industry begin innovating on their products soon after release to market</td>
<td>0%</td>
<td>2.8%</td>
<td>22.2%</td>
<td>52.8%</td>
<td>22.2%</td>
</tr>
<tr>
<td>Heavy investment in research is required to maintain a leading position in the industry</td>
<td>1.4%</td>
<td>2.9%</td>
<td>1.4%</td>
<td>27.5%</td>
<td>66.7%</td>
</tr>
</tbody>
</table>
4.5.4 Correlation Test between Product Obsolescence and Strategic Response

A Pearson correlations test was done to investigate the relationship between the three components obsolescence and the four components of the strategic response. The three components of obsolescence are customer demand, competition and innovation while the four components of strategic response are knowledge creation, research development, skill development and partnership. The analysis showed that there was a statistical positive significant relationship between customer demand and knowledge creation at 0.05 level of significance with \( r=0.251 \) and \( p=0.033 \), there was a statistical positive significant relationship between customer demand and research and development at 0.01 level of significance with \( r=0.345 \) and \( p=0.003 \). Moreover, there was a statistical positive significant relationship between customer demand and skill development at 0.01 level of significance with \( r=0.350 \) and \( p=0.003 \) and finally there was a statistical positive significant relationship between customer demand and partnership at 0.01 level of significance with \( r=0.451 \) and \( p=0.000 \). Competition and innovation did not statistically correlate with any component of strategic response as shown in table 4.15.

Table 4.15: Correlation between Product Obsolescence and Strategic Response

<table>
<thead>
<tr>
<th></th>
<th>Customer Demand</th>
<th>Competition</th>
<th>Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Creation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>(.251^*)</td>
<td>-0.132</td>
<td>0.082</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.033</td>
<td>0.273</td>
<td>0.501</td>
</tr>
<tr>
<td>Research and Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>(.345^**)</td>
<td>-0.042</td>
<td>0.116</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.003</td>
<td>0.728</td>
<td>0.343</td>
</tr>
<tr>
<td>Skill Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>(.350^**)</td>
<td>0.062</td>
<td>0.123</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.003</td>
<td>0.607</td>
<td>0.314</td>
</tr>
<tr>
<td>Partnership</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>(.451^**)</td>
<td>0.078</td>
<td>-0.027</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.000</td>
<td>0.518</td>
<td>0.827</td>
</tr>
</tbody>
</table>
4.6. Strategic Response
The study sought to examine the strategic responses that are employed in the company being studied, namely IBM. The responses that were highlighted were, knowledge creation, research and development, skill development and strategic partnerships/alliances.

4.6.1 Knowledge Creation as a Strategic Response
Under knowledge creation, the study sought to investigate the opinion that the heavy investment in research is required to maintain a leading position in the industry. It was found that 6.9% disagreed and strongly disagreed with the opinion, 82% agreed and strongly agreed with the opinion and 11.1% were neutral about the opinion. Consequently, the majority (82%) agreed and strongly agreed with the opinion as shown in Table 4.16.

The researcher sought to investigate the opinion that the business unit has an open door policy with management. It was found that 9.7% disagreed and strongly disagreed with the opinion, 76.4% agreed and strongly agreed with the opinion and 13.9% were neutral about the opinion. Thus the majority (76.4%) agreed and strongly agreed with the opinion as shown in the table 4.16 below.

Study sought to investigate the opinion that the business unit recognizes employees who innovate and share ideas. It was found that 6.9% disagreed and strongly disagreed with the opinion, 68.1% agreed and strongly agreed with the opinion and 25% were neutral about the opinion. Thus the majority (68.1%) agreed and strongly agreed with the opinion as shown in the table 4.15 below. Study sought to investigate the opinion that the business unit forms teams of members from different levels of the organization to work on solutions. It was found that 15.3% disagreed and strongly disagreed with the opinion, 68.1% agreed and strongly agreed with the opinion and 16.7% were neutral about the opinion. Thus the majority (68.1%) agreed and strongly agreed with the opinion as shown in the table 4.16 below.

From the responses, the researcher established that a majority of the individuals from different business units in IBM are encouraged to create knowledge and are given opportunities to share their experiences and insight.
## Table 4.16: Knowledge Creation

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My business unit encourages the sharing of ideas by employees</td>
<td>0%</td>
<td>6.9%</td>
<td>11.1%</td>
<td>41.7%</td>
<td>40.3%</td>
</tr>
<tr>
<td>My business unit has an open door policy with management</td>
<td>2.8%</td>
<td>6.9%</td>
<td>13.9%</td>
<td>37.5%</td>
<td>38.9%</td>
</tr>
<tr>
<td>My business unit recognizes employees who innovate and share ideas</td>
<td>1.4%</td>
<td>5.6%</td>
<td>25%</td>
<td>41.7%</td>
<td>26.4%</td>
</tr>
<tr>
<td>My business unit forms teams from different levels of the organization</td>
<td>2.8%</td>
<td>12.5%</td>
<td>16.7%</td>
<td>50%</td>
<td>18.1%</td>
</tr>
</tbody>
</table>

### 4.6.2 Research and Development as a Strategic Response

The study sought to investigate the opinion that the business unit sets aside time to collaborate with the research and development team. It was found that 36.1% disagreed and strongly disagreed with the opinion, 34.8% agreed and strongly agreed with the opinion and 29.2% were neutral about the opinion. It was therefore seen that a majority (36.1%) disagreed and strongly disagreed with the opinion as shown in the Table 4.17.

The researcher aimed at investigating the opinion that the business unit constantly emphasizes on awareness of the value the research and development team adds in developing solutions. It was found that 22.2% disagreed and strongly disagreed with the opinion, 48.6% agreed and strongly agreed with the opinion and 29.2% were neutral about the opinion. Thus the majority (48.6%) agreed and strongly agreed with the opinion as shown in Table 4.17.

Study sought to investigate the opinion that the business unit uses solutions produced by the research and development team to improve products released to the market. It was found that 19.4% disagreed and strongly disagreed with the opinion, 45.8% agreed and strongly agreed with the opinion and 34.7% were neutral about the opinion. Thus the majority (45.8%) agreed and strongly agreed with the opinion as shown in table 4.17.
From the findings presented above, it can be seen that a majority of the respondents saw the value in research and development as a practiced response in their respective business units. It can consequently be concluded that research and development is an activity that is both practiced and valued in the different units which make up IBM.

**Table 4.17: Extent of Research and Development**

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My business unit sets aside time to collaborate with the research and development team</td>
<td>6.9%</td>
<td>29.2%</td>
<td>29.2%</td>
<td>29.2%</td>
<td>5.6%</td>
</tr>
<tr>
<td>My business unit constantly emphasizes on awareness of the value the research and development team adds in developing solutions</td>
<td>5.6%</td>
<td>16.7%</td>
<td>29.2%</td>
<td>36.1%</td>
<td>12.5%</td>
</tr>
<tr>
<td>My business unit uses technology solutions produced by the research and development team to improve products released to the market</td>
<td>2.8%</td>
<td>16.7%</td>
<td>34.7%</td>
<td>36.1%</td>
<td>9.7%</td>
</tr>
</tbody>
</table>

**4.6.3 Skill Development as a Strategic Response**

A notable response to change in a turbulent industry is development of skill in an organization. The researcher thus purposed to examine the level of skill development in the organization through the surveying of the three questions. Study sought to investigate the opinion that the employees are encouraged to keep learning through different virtual programs. It was found that 86.1% agreed and strongly agreed with the opinion and 13.9% were neutral about the opinion. Therefore, the majority (86.1%) agreed and strongly agreed with the opinion as shown on table 4.18 below.

The study sought to investigate the opinion that the management provides opportunities for employees to develop their capacities. It was found that 5.6% disagreed and strongly disagreed with the opinion, 75% agreed and strongly agreed with the opinion and 19.4% were neutral about the opinion. Thus the majority (75%) agreed and strongly agreed with the opinion as shown in the table 4.18 below. Study sought to investigate the opinion that the business unit offers training programs. It was found that 12.5% disagreed and strongly disagreed with the opinion, 68.1% agreed and strongly agreed with the opinion and 19.4% were neutral about the opinion. Thus the majority (68.1%) agreed and strongly agreed with the opinion as shown in the table 4.18 below.
From the findings presented on skill development, it became evident to the researcher that skill development is a widely practiced phenomenon in the business units of the organizations as shown by the emphasis on learning and provision of opportunities for growth.

Table 4.18: Skill Development

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees in my business unit are encouraged to keep learning through</td>
<td>0%</td>
<td>0%</td>
<td>13.9%</td>
<td>47.2%</td>
<td>38.9%</td>
</tr>
<tr>
<td>different virtual programs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management provides opportunities for employees to develop their capacities</td>
<td>2.8%</td>
<td>2.8%</td>
<td>19.4%</td>
<td>47.2%</td>
<td>27.8%</td>
</tr>
<tr>
<td>My business unit offers training programs</td>
<td>1.4%</td>
<td>11.1%</td>
<td>19.4%</td>
<td>38.9%</td>
<td>29.2%</td>
</tr>
</tbody>
</table>

4.6.4 Partnership as a Strategic Response

The final component of strategic response was strategic alliances/partnerships. The study sought to investigate the opinion that the business unit’s leadership emphasizes on the need for partnership. It was found that 9.7% disagreed and strongly disagreed with the opinion, 70.9% agreed and strongly agreed with the opinion and 19.4% were neutral about the opinion. Thus the majority (70.9%) agreed and strongly agreed with the opinion as shown in the table 4.19.

The researcher sought to investigate the opinion that the business unit heavily relies on alliances and partnerships with other units and external partners. It was found that 9.7% disagreed and strongly disagreed with the opinion, 73.7% agreed and strongly agreed with the opinion and 16.7% were neutral about the opinion. Thus the majority (73.7%) agreed and strongly agreed with the opinion as shown in the table 4.19.

Study sought to investigate the opinion that the business units frequently organize meetings with other units/partners who support them. It was found that 27.8% disagreed and strongly disagreed with the opinion, 48.6% agreed and strongly agreed with the opinion and 23.6%
were neutral about the opinion. Therefore the majority (48.6%) agreed and strongly agreed with the opinion as shown in Table 4.19. It can thus be concluded that the business units which constitute IBM are encouraged to foster partnerships and alliances.

Table 4.19: Extent of Partnership

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My unit’s leadership emphasizes on the need for partnership</td>
<td>1.4%</td>
<td>8.3%</td>
<td>19.4%</td>
<td>41.7%</td>
<td>29.2%</td>
</tr>
<tr>
<td>My business unit heavily relies on alliances and partnerships with other units and external partners</td>
<td>1.4%</td>
<td>8.3%</td>
<td>16.7%</td>
<td>43.1%</td>
<td>30.6%</td>
</tr>
<tr>
<td>We frequently organize meetings between the unit and other units/partners who support us</td>
<td>5.6%</td>
<td>22.2%</td>
<td>23.6%</td>
<td>37.5%</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

In conclusion of strategic responses, the researcher determined that all components of strategic response are espoused and encouraged in all the business units which were examined in the study. This is proven by the high level of respondents agreeing or strongly agreeing to the statements which point to a high degree of knowledge creation, research and development, skill development and partnerships.

4.7. Regression Analysis

A regression analysis was done to investigate the extent to which strategic response is affected by disruptions, uncertainty and obsolescence. The regression model was $Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3$ where, $Y$=strategic response, $B_0$ = Constant $X_1 = $Disruption $X_2 = $Uncertainty, $X_3 =$ obsolescence and $B_1$, $B_2$, and $B_3$ are coefficients of $X_1$, $X_2$ and $X_3$ respectively.

From the model summary table below it was found that $R=0.297$ meaning that the correlation between the dependent variable($Y$) and the independent variables($X_1$, $X_2$ and $X_3$) is low. $R^2 = 0.088$ meaning that all the independent variables ($X_1$, $X_2$ and $X_3$) can explain 8.8% of the variation in strategic response ($Y$).
Table 4.20: Regression Model Summary

<table>
<thead>
<tr>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.297(a)</td>
<td>0.088</td>
<td>0.046</td>
</tr>
</tbody>
</table>

From the coefficients table depicted in Table 4.21, it was found \(B_0 = \text{constant} = 2.673\), \(B_1 = 0.240\), \(B_2 = -0.324\), \(B_3 = 0.362\) and therefore the regression model will be \(Y = 2.673 + 0.240X_1 - 0.324X_2 + 0.362X_3\)

The model shows that:

Increasing disruptions \((X_1)\) by one unit will increase strategic response \((Y)\) by 0.240.

Increasing uncertainty \((X_2)\) by one unit will decrease strategic response \((Y)\) by 0.324.

Increasing obsolescence \((X_3)\) by one unit will increase strategic response \((Y)\) by 0.362.

The results prove that uncertainty negatively affect the strategic response while disruption and obsolescence positively affect the strategic response.

Obsolescence is found to be the one highly affecting strategic response.

Table 4.21: Coefficients of Regression Equation

<table>
<thead>
<tr>
<th>Unstandardized Coefficients</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.673</td>
</tr>
<tr>
<td>Disruption</td>
<td>0.24</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>-0.324</td>
</tr>
<tr>
<td>Obsolescence</td>
<td>0.362</td>
</tr>
</tbody>
</table>
4.8 Chapter Summary
This chapter presents the results and findings of the study. Findings are presented in frequency tables and graphs/figures. The presentation is aligned to the research questions and covers on the reports of the extent disruption lead to strategic response, extent uncertainty lead to strategic response, the extent obsolescence lead to strategic response and lastly the regression analysis showing the extents disruption, uncertainty and obsolescence affects the strategic response. The next chapter presents the discussion of findings, conclusions and recommendations.
CHAPTER FIVE

5.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter serves to provide a discussion on the findings of the study for each of the research questions through the provision of its similarities and deviations from previous empirical studies. The chapter begins with a summary of the study through highlighting the research problem, methods of data collection, and condensed findings for each of the research questions that were explored. In the sections which follow, the researcher engages in detailed discussions, conclusion and recommendations for further research for each respective research question.

5.2 Summary

The main aim of the study was to examine the strategic initiatives an organization adopts in response to technological turbulence through studying International Business Machines (IBM) Africa. A census was adopted for the study which comprised of more than 20 countries which make up the larger organization in Africa as well as across the different business units which IBM is comprised of. Out of the 105 who were to be sampled, 72 responded, representing a 69% response rate. The collection of data was carried out through a self-administered questionnaire, which was then analyzed using two computer analytical programs. The analysis of the data employed the use of descriptive and inferential statistics. In tackling the research problem at hand, the researcher primarily empirically tested the components of technological turbulence and the responses employed in the sampled unit. Technological turbulence was comprised of three independent variables, which were disruption, uncertainty and product obsolescence, while strategic response was constituted by knowledge creation, skill development, research and development and strategic partnerships. A Likert scale of 0 to 5 representing strongly disagree to strongly agree was utilized in testing the extent of technological turbulence in the industry IBM operates in and the accompanying strategic responses which the firm adopts.
On the demographics, it became apparent that the population of the firm is heavily dominated by men, as is demonstrated by the percentage of men (72%) versus that of women (28%). This serves to show that the firm is heavily dominated by the male gender, and could be a pointer to the competitive nature of the industry. Under age, the highest category was comprised of those aged between 26 to 30 years (27.8%), highlighting the youthful workforce in the firm. It was followed closely by those aged between 31 and 35 years (22.2%). On the other hand, it also serves to show that senior management is run by older staff, as can be seen in the positions held at IBM with only 4% in senior management, 10% in midlevel management, 15% in first level management and 71% serving as non-management staff. On level of education, the majority of respondents (41.7%) had a bachelor’s degree, followed closely by 38.9% who hold a master’s degree, with 8.3% wielding a doctoral degree. The study found that 89% of the sample had a bachelor’s degree or more, indicating the high level of academic qualification required by the company. As far as experience in the technology industry is concerned, a majority of the sample (62.5%) had worked in the industry for more than five years, depicting the high level of experience that the respondents have had in the industry and thus more insight gained over the years. 57% of the respondents had worked with IBM for 1 to 4 years, with 13% having worked in IBM for more than 12 years.

As mentioned earlier, the researcher attempted to survey across business units, with the highest participation emanating from the GTS (22%), GBS (18%) units, and 21% of the respondents who cited that they support all business units. The sampling across business units would be helpful in validating the results which would be a good representation of the findings on IBM Africa. Before testing the extent of technological turbulence, the researcher sought to find how the respondents viewed their business environment, and the results pointed to the conclusion that there is a level of change in the environment, with 35% selecting the “changing” option, where there is fast incremental change, 19% highlighting discontinuous change, while 17% describe the change as surpriseful. From these findings, the researcher concluded that since 71% of the sample selected a fast changing environment, the business environment IBM operates in is fast changing indicative of a turbulent environment.
The rest of the sections tested the extent of technological turbulence represented by disruption, uncertainty, and product obsolescence, with a section measuring strategic responses. This was done in a bid to determine the extent to which technological turbulence influences strategic response.

5.3 Discussion
5.3.1 Disruption and Strategic Response
The study revealed that there is indeed a high level of disruption in the technology as was made evident by the findings on new technology, rivalry and level of new entrants. On the first aspect of new technology, it was found that the superiority of new technology is undisputed and that increasingly, new technology outperforms incumbent technologies. The study also pointed to the prevalence of new technology through strong responses of agreement on the drastic change of previously key success factors. This then shows that there is a high level of disruption as seen in the prevalence and impact of new technology in the industry in scope. Christensen, Raynor and McDonald (2015) cite disruption as a process that can take place both from within or without the industry. Therefore, a firm needs to be keen on the trends in order to catch and adopt to revolutionary change before it is wiped out and rendered obsolete. The study affirmed the findings of Christensen (1997), who found that demand disruption occurred when the total share of products in a market exceeds the share of products that are based on a dominant technology. Moreover, the findings aligned with Sood and Tellis (2010), who found that disruption is driven mostly by new technology which outperforms the dominant technology. The change of competencies and success factors as found in the research reveal the volatility of technology which is a key indicator of a high level of disruption (Verspeet, 2013). Thus new technology is a common ingredient in a disruptive environment, and this has been reinforced by the findings and literature highlighted above.

The study revealed that there is a significant level of threat from new entrants, which points to the disruptive nature of the industry which could emanate from new entrants in the industry which IBM operates in. A key variable of disruption is the extent of threat from new entrants of which there was a high prevalence according to the findings of the study. This agreed with the findings of Christensen (1997), who propagated the theory of disruptive
technology which was later renamed to disruptive innovation, found that disruption often has its genesis from entrants who are external to the industry. It typically roots from a cheaper or simpler offering which offers convenience, and is not comparable to superior dominant products. By catering to an ignored market segment, the disruptor can then be able to gain ground through improvement and ultimately displace the incumbent in the industry.

In order to measure the level of disruption, the researcher measured the extent of rivalry within the industry. That is, how fierce are competitors within the industry? It was revealed in the study that there indeed is intense rivalry in the technology industry given the majority of the respondents agreeing to the questions that aimed to test this. Verspeet (2013), found that a disruptive industry is plagued with intense rivalry, with the players striving to outperform each other through production of better performing products. Christensen, Raynor and McDonald (2015) also highlight that incumbents in an industry focus on improving products in order to stay ahead of the competition. Those which opt out of this will not be able to survive the fierce competition in place.

The study thus shows that there is a high level of disruption in the technology industry which IBM operates in, and serves to indicate the extent of technological turbulence in the technology industry. Since there is a great extent of disruption in the industry, what is the response of the company if any? According to the findings, there was a correlation between knowledge creation, research and development, partnership and the disruption which new technology would bring. As a result, the threat of new technology seemed to affect the creation of knowledge, R&D, and strategic partnerships which was also affirmed by the findings of Bower and Christensen (1995) who found that a firm constantly needs to innovate in order to deal with technological turbulence which comes in the form of disruption. Knowledge creation and R&D were highlighted as responses to disruption by Charitou and Markides (2003), who carried out a study of 98 companies and found that to sustain a position in the industry innovation driven by R&D and creation of knowledge is critical. Drucker also reinforced the importance of knowledge workers in this era of business in order to create and maintain an edge (Edersheim, 2007). It can thus be established that the advent of new technology brings forth a level of response from the firm which was studied.
However the threat of new entrants and rivalry of competition did not have any statistically significant correlation with any of the responses tested. This could be explained by the fact that whether technology comes from new entrants or incumbents, the main area a firm focuses on is the technology that is introduced. Thus whether from within or without the industry, the goal of the firm in the technology industry is to adequately react to the threat of new technology. So how does disruption relate to strategic response? The study found that increasing disruption will increase the level of strategic response, which does prove that disruption does trigger a strategic response from a firm. This is also affirmed by the findings of the researcher in the second chapter in which various writers determined that survival in an increasingly disruptive environment would require a level of strategic response (Drucker, 1994; Verspreet, 2013; Sood & Tellis, 2011). Moreover, Schumpeter (1930) points out that any firm that desires to survive in this age should prevent death by creatively destroying its assumptions and pursuing new ways and strategies of executing business. The study can thus establish that disruption affects the level of strategic response by an organization.

5.3.2 Uncertainty and Strategic Response

The study found that there is a great extent of uncertainty in the technology industry through examination of three critical factors which drive uncertainty; namely complexity, ambiguity and volatility. Findings revealed that a majority (85% or more) of the sampled individuals strongly agreed or agreed to the statements which point to a high level of complexity in the industry. The study showed that there is a great extent of complexity in the environment, which is reinforced by the findings of Snowden and Boone (2007) who defined complexity as those systems which experience minor impacts that can produce major consequences and where the industry is intimately connected with other industries. This also agreed with the findings of Giessler and Krys (2013) who found that complexity requires a firm to account for a number of factors while creating strategy, where network effects and change in different levels prove decision making precarious.

Another component of uncertainty is the extent of ambiguity which refers to the lack of clear variables to choose from when arriving at a business decision. The results of the study revealed that there is a high level of ambiguity in the technology environment, which
explains the different factors that contribute to a manager’s decision. As demonstrated in the Kodak example which was pointed out by Cummings and Kiesler (2003), a seemingly insignificant product could be the next big thing in the industry. The extent of ambiguity points to in the environment serves as a major driver of uncertainty and consequently technological turbulence. In the technological world, one decision can mean life or death for a company, but without adequate variables managers would be have ambivalent feelings about decisions taken (Giessler & Krys, 2013).

The final component of uncertainty was volatility which is the level of turnover of resources in a firm and the effects of changes in the macroeconomic environment. The study found that there is a great extent of volatility in the technology industry with a majority of the respondents agreeing and strongly agreeing to statements which underpin volatility. Based on the findings, the researcher determined that uncertainty does exist in the industry which was studied as demonstrated by the level of volatility, ambiguity and complexity found.

The study revealed that there was a statistically significant positive correlation between complexity and skill development, while there was a negative correlation between R&D and ambiguity. Finally, all other components of uncertainty did not have any correlation with strategic response. The greatest challenge for companies in the technology industry as far as uncertainty is concerned is the fact that it is intimately interconnected with other industries, introduction of technology is primitive and competition emanates from within and without (Dasgupta, Sahay and Gupta, 2009).

Rosenberg (2007) points out that due to the primitive nature of newly introduced technology a company should keep innovating through fostering and enabling of new ideas driven by research and development, partnerships and knowledge creation. It is interesting to note that Verspeet (2013) found that there is no incentive for incumbents to change approaches in the creation, production and selling of a product which serves to explain the negative correlation between ambiguity and strategic response.
There seems then to be no need to react to ambiguity by incumbents, which is reinforced by Sood and Tellis (2010) who found that they have an inherent need for protecting existing portfolios and cashflows. The findings seem to contradict Rosenberg (2007) who found that the fast spread of technology which signals volatility requires a great degree of response in order to survive and stay abreast.

Using regression analysis, it was found that a change in uncertainty would decrease the level of strategic response. It is interesting to note that a study conducted by Verspeet (2013), found that incumbent players have little or no incentive to change how they conduct business. This is moreover true when the incumbents have assured revenues from their existing portfolio and are in uncertain and unpredictable times. This serves to explain the negative response towards level of uncertainty. The greatest dilemma for technology companies in view of uncertainty is owed to the fact that most technologies are introduced in a primitive condition and thus would not serve as an incentive to pump resources into it unless there is a business case for it. Giessler and Krys, (2013) point out that it can be dangerous to ignore uncertainty but in the same breadth Rosenberg (2007) notes that a firm can never adequately predict the future and would thus opt to ignore it and keep things as they are. In the case of the study, the firm opts to drive down its level of strategic response when faced with the advent of uncertainty.

5.3.3 Product Obsolescence and Strategic Response

The study established that there is a high degree of product obsolescence as was highlighted by the responses which sought to test out this variable. The researcher aimed to study product obsolescence as an indicator of turbulence which entailed three aspects namely, customer demand, level of competition and innovation in an industry. On the issue of customer demand, the study examined the sample using three questions. The first question sought to relate the performance of a company with the number of products it releases. The study established that well performing companies are those which constantly release products in a bid to protect market position. On the contrary, only a small number of the respondents disagreed or strongly disagreed giving a strong indication of the influence of product releases in driving the success of a company. This also further points to the fast pace of change in an
organization. The study also found that customers highly regard companies which constantly introduce products, which points to the constant pressure on companies to keep improving and releasing new technology. This would then further truncate the life of products in the market as was found by a study conducted by Hofer (1975). Going hand in hand with this is the issue of customers constantly demanding for better products, which was found to be evident in the study that was conducted. Therefore, the pressure exerted on the firms in the industry by customers is evident and could influence the strategic decisions a firm makes (Lu & Marjot, 2008).

Increasingly shorter product life cycles are an indication of the turbulent nature of the market as was found by Lu and Marjot (2008). It has been observed that all products in the technology market have a finite life cycle, and the duration of the cycle is an indicator of the level of competitiveness in the market. In the technology industry, product cycles are taken a step further and classified as technology life cycles. Shahmaneihatghieh, Tolonen and Haapasalo (2015) define each of the steps in the technology life cycle which are comprised of introduction, growth maturity and decline, very much like the more common product life cycle. The literature from their study pointed to a correlation between the length of the cycle and the level of change in a respective industry. Moreover, it was noted from various studies that it has become increasingly difficult for a firm to introduce a product before it is rendered obsolete, owing to the fast pace of change in select industries. Customers in recent times have become major drivers of innovation, constantly demanding for new and improved products, greatly affecting a product’s life cycle (Lu & Marjot, 2008).

The other component of product obsolescence was competition and the researcher examined this through the rivalry, intensity of innovations and number of new entrants in the industry. The study found that there are a series of rapid innovations that are experienced in the industry, strongly indicating the high level of rivalry in the market. More to this, it was found that the industry is comprised of many new entrants as well as numerous product introductions in the market. Competition has been found to be a key driver in product obsolescence, where studies have found that the higher the level of competition the shorter the life cycle of products in the technology industry (Wu, Aytec, Berger & Ambuster, 2007;
Lu & Marjot, 2008). Wu, Aytec, Berger and Ambuster (2007) found in their study that firms in the technology industry are faced with an increasingly mounting pressure by customers to produce not only new innovations, but to deal with the reality of their products becoming increasingly outdated and ultimately obsolete.

The final aspect of product obsolescence was the issue surrounding innovation. The study therefore aimed to examine the level of innovation in the industry and it was found that a company which wanted to stay ahead of competition had to release products rapidly. This is an indicator of the need for a firm to constantly innovate in order to protect its position. More to this, the study unraveled the trend of firms in the industry tending to continue innovating even after a product is released in the market. Heavy investment in research was also a requirement for firms that aim to achieve or maintain a leading position in the industry. The firm therefore would need to invest heavily in innovation in a bid to protect strategic positions and would thus influence strategic direction. In general, the study thus established that there were short product life cycles in the industry owing to the high level of innovation, customer demand and competition in the industry. From this, the researcher was thus able to establish that there exists short product life cycles in the technology industry, which has been indicated by the level of competition, innovation and insatiable customer demand. This agreed with the writings of Shahmaniehatghieh, Tolonen and Haapasalo (2015), who found that the shortening of a product life cycle is due to the broader trends in the industry toward rapid innovation cycles.

Breaking the variables of product obsolescence apart, it was found that customer demand was a major driver of strategic response. This was highlighted by its statistical positive significant correlation to research and development, skill development, knowledge creation and strategic partnerships. However, competition and innovation did not statistically correlate with any components of strategic response tested. This could be a pointer to the commonly held belief by managers that the main aim of business is to attend to customer needs, and as a result, customer needs would drive a firm’s strategic imperatives. All in all, it was established in the study that there is indeed a high level of product obsolescence indicated by the short product life cycles.
Product obsolescence had a positive effect on strategic response as was demonstrated by the regression analysis that was performed on the data. More to this, of all the responses tested, obsolescence was the aspect which highly affected strategic response. As Giessler and Krys (2013) put it, some firms like the tire industry would never change, but in the technology industry, not only do firms need to reduce the time to release new products to the market, but also drive demand for current technology down in a bid to drive adoption by the market of new and improved products. Businesses should therefore aim to adequately deal with the aspect of short product life cycles to ensure that they remain competitive in the market. This is further affirmed by Mwangi (2007), who found that product obsolescence and technology developments were major drivers of strategic response in the firm studied. Therefore the study established that there is a high level of product obsolescence and that this influences implementation of strategic response.

5.4. Conclusion
5.4.1 Disruption and Strategic Response
The study explored disruption as an indicator of technological turbulence and it was found that there was a high level of disruption in the technology industry. This was made evident by the majority of respondents acknowledging that a disruptive technology can emanate from any industry and that the key success factors of an industry are constantly changing rapidly. More to this, there are many new entrants and intense competition in the industry indicating that disruption is a real issue that firms in the technology industry need to be keen on. It was found that there is a positive effect of disruption on strategic response, which implies that IBM reacts to disruption by instituting strategic initiatives.

5.4.2 Uncertainty and Strategic Response
The study concludes that there is a high level of uncertainty in the technology industry as was demonstrated by the complexity, ambiguity and volatility existent. Firms in the industry are faced with the challenge of predicting a future that cannot be easily tamed or accurately monitored. This means that the decisions they make now should be done without a clear view of the future which is a dangerous exercise for most business leaders, especially in the technology industry. With this in mind, it was found the firm studied would opt to limit strategic response in uncertain times.
5.4.3 Product Obsolescence and Strategic Response
The study established that product obsolescence is a phenomenon that plagues the technology industry, which reinforced other studies that were done in this area. The constant demand from customers for better products, intense competition and rivalry, coupled with rapid innovations have rendered product life cycles increasingly shorter. With pressure from within and without a firm thus needs to respond to this through strategic responses which can constitute knowledge creation, skill development, R&D, and strategic partnerships among others. Thus it was concluded that product obsolescence does affect strategic responses positively, and it was the highly affecting variable of the three that were tested in the study.

5.5 Recommendations
5.5.1 Recommendations from Study
The following recommendations are made in tandem with the research questions which were outlined in the study.

5.5.1.1 Responses to Disruption
The study recommends that the organization closely monitor the trends in their respective environment, and adequately respond to them through any avenue that would have the most impact and benefit. As the firm studied already responds to disruptive technology and processes, other firms in the industry should also do the same or will be rendered inadequate in future. Disruption changes competencies and market leaders, thus firms need to be proactive and courageous enough to bring change to their respective organizations in a bid to have sustainable profitable performance.

5.5.1.2 Responses to Uncertainty
The study recommends that firms should never ignore the developments of uncertainty, as there are opportunities that would need to be exploited and threats that should be dealt with. It is noted that there is a high level of uncertainty and making decisions can be daunting, especially for the business leaders. However, although accuracy cannot be achieved as far as prediction of the future is concerned, managers should observed the trend and be the pacesetters in the industry, guided by the needs of customers and the prospect of tomorrow. All in all, when a firm does not deal with uncertainty, it misses a chance to embrace new possibilities. Therefore, the study recommends that firms examine trends in the market and react accordingly to the uncertainty the industry they are in presents.
5.5.1.3 Responses to Product Obsolescence
The technology industry is constantly faced with intense competition and a series of rapid innovation, making short product life cycles a mainstay factor for firms to consider. The study therefore recommends that firms should not stick to the old way of doing things or protect their existing portfolio, but would rather aim to constantly innovate in a bid to not only beat competition, but do better than they are now. It was found that the image of a company which constantly produces useful products is held in high regard, and as such should serve as an incentive for businesses to innovate in order to stay ahead of the market.

5.5.2 Recommendations for Further Research
The study recommends that future researchers in this area conduct studies on other aspects of technological turbulence which were not highlighted in this study. This would serve to holistically understand the component of technology in a business, and how they should correctly handle it. In addition to this, researchers can explore other components of the macroeconomic business environment such as political, legal, social, environmental aspects. This would aim at determining what the key factors are in each aspect, and how they affect business decisions and profitability.

Moreover, the study was only carried out in International Business Machines (Africa), and can thus be replicated in other firms across various industries. This would serve to consolidate the knowledge around technological change in various industries, and inform business leaders and policy makers on how important and impactful technology is to an industry.
REFERENCES


APPENDIX I: INTRODUCTORY LETTER

Sasaka Doreen Shimuli  
United States International University,  
P.O. BOX 14634, 00800,  
Nairobi.  
Kenya.  
10/3/2017

Dear Respondent,

My name is Doreen Sasaka Shimuli and I am a graduate student at United States International University. I am undertaking a study on the strategic outcomes of technological turbulence in the technology industry in order to successfully complete the requirements of attaining a postgraduate degree. I will be performing a case study on your company and would appreciate your approval to conduct a study on the organization.

Once this study is complete it will enable the management of the organization to make more informed decisions concerning the day to day running of the firm, and can also be used by the government to inform laws concerning the technology industry. Better employee motivation can also be achieved using the information gathered in this study. Knowledge gathered will also be available to other individuals who will be interested in the field.

I plan to administer a questionnaire that will take approximately 5 minutes to complete. Kindly answer each and every question as honestly as possible as the results of the study depend on you. Please do not indicate your name for the sake of confidentiality; I will collect the questionnaires in person to ensure no other person has access to your answers.

A summary copy of all the results will be shared with the organization. Thank you for taking time to provide me access to the information you have.

Sincerely,

Doreen Sasaka Shimuli

sasaka4@gmail.com
APPENDIX 2: QUESTIONNAIRE

I am a graduate student at USIU undertaking research on the strategic responses to technological turbulence in an organization. Kindly assist me by taking 5 minutes to answer this questionnaire.

SECTION A: GENERAL INFORMATION

1. Kindly indicate your gender:
   □ Male
   □ Female

2. Age category in years
   □ 21 – 26 years
   □ 27 – 32 years
   □ 33 – 38 years
   □ 39-44 years
   □ Above 45 years

3. Your current job role falls under which category?
   □ Sales
   □ Finance
   □ Sales
   □ Consulting
   □ Procurement
   □ Technical
   □ Research and development
   □ Business controls
   □ Legal
☐ Human resources
☐ Marketing
☐ Administrative support
☐ Other

4. Kindly indicate your position in IBM
☐ Non-management staff
☐ First line manager
☐ Middle level manager
☐ Senior manager

5. What is your highest level of education?
☐ High school diploma
☐ College diploma
☐ Bachelor’s degree
☐ Master’s degree
☐ Doctoral degree

6. How long have you have worked in the technology industry?
☐ Less than a year
☐ 1-5 years
☐ 6-10 years
☐ 11-15 years
☐ 16-20 years
☐ More than 20 years
7. How long have you worked with IBM?

☐ Less than a year

☐ 1-4 years

☐ 5-8 years

☐ 8-12 years

☐ More than 12 years

8. Which business unit do you work in?

☐ GTS

☐ GBS

☐ Global Markets

☐ Security

☐ Cloud

☐ Analytics

☐ Watson Customer Engagement

☐ Research

☐ Digital Sales

☐ Systems HW

☐ Cognitive Solutions

☐ I support all business units

☐ Other
9. In your view, how would you describe the business environment that you are operating in? Select only one that applies

- Repetitive: No change and future is recurring
- Expanding: Slow incremental change and extrapolatable future
- Changing: Fast incremental change with a predictable future
- Discontinuous: Discontinuous predictable change with a partially predictable future
- Surpriseful: Discontinuous unpredictable change with an unpredictable future
SECTION B: DISRUPTION
To what extent do you agree with the following statements? Select the option that most closely reflects your opinion. Answer as per the business unit you are in.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>New entrants pose a significant threat to companies in the industry we operate in</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Many companies in the industry are abandoning traditional business to focus on emerging technology</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Core strengths of companies have been wiped out in the recent past in the industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Current industry players introduce products that would pose a significant threat to technology leaders</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Many former leading companies in the industry are struggling today</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>New players who were not in existence five years ago are leading in our industry today</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>In our industry, success factors which firms compete on have changed drastically in the recent past</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Customers requiring services from the industry we are in are now using greatly advanced technology they were not using three years ago</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>New technologies increasingly outperform current technology in the industry we are in</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
### SECTION C: UNCERTAINTY

To what extent do you agree with the following statements? Select the option that most closely reflects your opinion. Answer as per the business unit you are in.

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COMPLEXITY</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>The industry we are in is intimately connected with other industries</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>There are macroeconomic changes on a global or regional scale which greatly affect our industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Competition is not only from within, but also from outside our industry</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>AMBIGUITY</strong></td>
<td></td>
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</tr>
<tr>
<td>Companies in our industry frequently change strategies to adopt new technology</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Impact of product introduction by any players in our industry is normally ambiguous</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Managers in our industry cannot accurately predict success/failure of a product</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>VOLATILITY</strong></td>
<td></td>
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<tr>
<td>The use of a product during the development stage, will not be identical with it’s use at the time of commercialization</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>There is a fast spread of technology in our industry we operate in</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>In our industry, minor changes in technology can lead to great changes in market position</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
SECTION D: SHORT PRODUCT LIFE CYCLES

To what extent do you agree with the following statements? Select the option that most closely reflects your opinion. Answer as per the business unit you are in

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTOMER DEMANDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A well performing company is constantly releasing products to maintain a</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>competitive position in our industry</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Customers highly regard companies which constantly release products in</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>our industry</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Customers constantly demand for better performing products in our industry</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>COMPETITION</td>
<td></td>
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</tr>
<tr>
<td>The industry we are in experiences a series of rapid innovations on</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>products</td>
<td></td>
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</tr>
<tr>
<td>Products in our industry do not experience an extended period of</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
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<tr>
<td>dominance</td>
<td></td>
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<td></td>
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<tr>
<td>Our industry is comprised of many new entrants</td>
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</tr>
<tr>
<td>Numerous products are introduced in our industry annually</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>INNOVATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In our industry, release of products by any company has to be fast or</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>else it will be beaten by competition</td>
<td></td>
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<tr>
<td>New products in our industry are characterized by incremental changes</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>and uses</td>
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</tr>
<tr>
<td>Firms in our industry begin innovating on their products soon after</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>release to market</td>
<td></td>
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</tr>
<tr>
<td>Heavy investment in research is required to maintain a leading position</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>in the industry</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
SECTION E: TECHNOLOGICAL TURBULENCE AND ITS EFFECT ON KNOWLEDGE CREATION, SKILL DEVELOPMENT, R&D AND STRATEGIC ALLIANCES

To what extent do you agree with the following statements? Select the option that most closely reflects your opinion. Answer as per the business unit you are in

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My business unit encourages the sharing of ideas by employees</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My business unit has an open door policy with management</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My business unit recognizes employees who innovate and share ideas</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My business unit forms teams of members from different levels of the organization to work on solutions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My business unit sets aside time to collaborate with the research and development team</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My business unit constantly emphasizes on awareness of the value the research and development team adds in developing solutions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My business unit uses technology solutions produced by the research and development team to improve products released to the market</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Employees in my business unit are encouraged to keep learning through different virtual programs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Management provides opportunities for employees to develop their capacities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My business unit offers training programs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
My unit’s leadership emphasizes on the need for partnership | 1 | 2 | 3 | 4 | 5
---|---|---|---|---|---
My business unit heavily relies on alliances and partnerships with other units and external partners | 1 | 2 | 3 | 4 | 5
---|---|---|---|---|---
We frequently organize meetings between the unit and other units/partners who support us | 1 | 2 | 3 | 4 | 5
---|---|---|---|---|---

Kindly give suggestions on how a technology company can deal with rapidly changing technology.

THANK YOU VERY MUCH FOR TAKING YOUR TIME TO COMPLETE THIS QUESTIONNAIRE