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Assignment 7

Research Title

**The impact of technological evolution on business innovation strategy in
Johannesburg South Africa.**

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Acknowledgements

Thank you to my lectures and participants for aiding in the completion of this research study in these unprecedented times.

Abstract

Business models are evolving from traditional Brick and Mortar to e-commerce with online retail sales growing 300% since the year 2001. Employee skills and changing and may need to be restructured and marketing is shifting from traditional media to internet-based applications such as YouTube or Facebook. Innovation strategy is now becoming more important than ever as businesses who do not invest in product improvement, or a disruptive or breakthrough innovation approach are unable to successfully operate due to the advancements in technology. The results from this study will provide valuable insight on the true importance of innovation strategy's purpose to obtain a competitive advantage in relation with technological evolution. In-depth interviews were conducted with twenty participants. Responses were analysed using descriptive statistics which revealed certain findings. It was found that the concept of a business innovation strategy is not fully understood by most participants which highlights one of the core problems mentioned in the research problem which is the slacking of the business innovation strategy. The results suggest that most participants should focus more on educating themselves in the concepts and intricacies of business innovation strategy so that they are not only able to understand their importance but effectively execute them to combat technological evolution.

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Research Title

The impact of technological evolution on business innovation strategy in Johannesburg South Africa.

1. INTRODUCTION

1.1 Contextualisation

Businesses that do not technologically evolve and adapt using business innovation strategy remain stagnant in business as a whole and are thus unable to operate at a competitive level.

The reasons why this is happening is because technology is evolving rapidly on a global scale that is constantly changing the way the world operates. Marketing specialist Christen Evans argues that every year, the evolution of technology is one of staggering promise and opportunity – as well as uncertainty because the future may be unknown, but digital advancement continues to reshape the world in ways that encourage people to form new habits, and, in most cases, these changes translate into a range of opportunities and disruptions across every industry (Evans, 2020).

Business innovation strategy plays a vital role in matching the world pace of technological evolution because it encourages advancements in technology or services, usually by investing money in research and development activities and when effective should add something unique to the product or service being developed (Kennedy, 2020). A business innovation strategy is vital when a company wants to remain relevant or gain a competitive advantage and is especially necessary when compared to the rate technology is evolving because if not done continuously it is almost certain the world and market will change leaving the company behind.

The relationship between technological evolution and business innovation strategy is not a new thinking point and has been widely discussed due to the impact it has on the business environment, however the willingness of companies to acknowledge and implement this reality is not always accomplished. Innovation strategy is now becoming more important than ever as businesses who do not invest in product improvement, or a disruptive or breakthrough innovation approach are unable to successfully operate due to the advancements in technology.

Previous literature suggests that the importance of using strategic management and business innovation to keep up with technological evolution is often underutilised. It also suggests that managers can predict technological evolution by analysing how it evolves which is not done frequently enough and that globalisation has had an impact on technological evolution which encourages collaboration. The theories of disruptive innovation and technological evolution itself are also hold relevance in the study due to the direct link they have to the problem.

Therefore, the concepts and paradigms relating to this topic will be explored, the methodology, research design, plan and the theoretical foundation of previous literature will be discussed to gain a rounded viewpoint of the content. Lastly the ethical considerations, limitations and anticipated contributions of the study will be explored to determine how this study will make an impact while remaining realistic and morally sound.

1.2 Rationale and relevance

The fourth industrial revolution will change not only what we do but also who we are, (Schwab, 2016). With the coming of the fourth industrial revolution businesses need to recognise how the continuous evolution of technology impacts their business in its entirety, from the way they conduct business to what their customers want and expect. This continuous technological evolution is changing every aspect of business operation and is more relevant now than ever due to the speed of this technological evolution. Business models are evolving from traditional Brick and Mortar to e-commerce with online retail sales growing 300% since the year 2001, (Shabat, 2019). Employee skills are changing and may need to be restructured and marketing is shifting from traditional media to internet-based applications such as YouTube or Facebook.

Innovation strategy is now becoming more important than ever as businesses who do not invest in product improvement, or a disruptive or breakthrough innovation approach are unable to successfully operate due to the advancements in technology. Examples could include the downfall of Blackberry or more notably Blockbuster who went bankrupt in 2010 as they had no innovation strategy and Netflix their competitors who identified the evolution in technology and applied an innovation strategy is now a multi-billion dollar company, (Satell, 2016).

The researcher believes that establishing the extent to which technological evolution influences business innovation strategy will provide useful insight to businesses as the world enters its fourth industrial revolution and technology is evolving at an exponential rate. The results from this study will provide valuable insight on the true importance of innovation strategy purpose of encouraging advancements in technology or services and investing money in research and development activities in order to obtain a competitive advantage in relation with technological evolution.

1.3 Problem Statement

Technology is evolving rapidly on a global scale that is constantly changing the way the world operates. Marketing specialist Christen Evans argues that every year, the evolution of technology is one of staggering promise and opportunity – as well as uncertainty because the future may be unknown, but digital advancement continues to reshape the world in ways that encourage people to form new habits, and, in most cases, these changes translate into a range of opportunities and disruptions across every industry (Evans, 2020).

Business innovation strategy play a vital role in matching the world pace of technological evolution because it encourages advancements in technology or services, usually by investing money in research and development activities and when effective should add something unique to the product or service being developed (Kennedy, 2020). A business innovation strategy is vital when a company wants to remain relevant or gain a competitive advantage and is especially necessary when compared to the rate technology is evolving because if not done continuously it is almost certain the world and market will change leaving the company behind.

The relationship between technological evolution and business innovation strategy is not a new thinking point and has been widely discussed due to the impact it has on the business environment, however the willingness of companies to acknowledge and implement this reality is not always accomplished. Businesses are weary of changing a strategy that is currently working for them or has succeeded in the past and try to avoid the high costs of business innovation strategy. Business innovation strategy is about pushing boundaries and being out of the ordinary which is what allows smaller companies that lack global success to seemingly come out of nowhere, and dominate the market but the complexity of innovation is that you never know what might happen with a product and the success or failure it can bring a company, (Kennedy, 2020). As a result of the risk and resources it takes, companies tend to slack on the business innovation aspect of their business while technological evolution continuous to change making the gap between what the company offers and what is required of them larger.

Businesses that do not technologically evolve and adapt using business innovation strategy remain stagnant in business as a whole and are thus unable to operate at a competitive level.

1.4 Purpose/ goal

The research goal had the purpose which was to examine the extent to which technological evolution influences business innovation strategy.

1.5 Research question

The research question of this study is: To what extent does technological evolution influence business innovation strategy?

1.6 Research Hypothesis

A hypothesis is a tentative or conditional statement about a phenomenon or relationship between variables that can be tested and is used in quantitative study's, (du Plooy-Cilliers, et al., 2018). As this study is quantitative in nature a hypothesis will be created and research will be conducted to provide evidence in favour of or against the hypothesis. The hypothesis is as follows:

There is a positive relationship between technological evolution and business innovation strategy.

The accuracy of this hypothesis will be tested by measuring and examining the relationship between technological evolution and innovation strategy and analysing if there is a positive or negative effect from businesses who use innovation strategy during technological evolution compared to those who do not.

2. LITERATURE REVIEW

2.1 Theoretical Foundation

Theories form the academic foundation of every discipline and allow the transformation of information into knowledge and may be defined as a body or an organised set of assumptions, concepts, principles and relationships we use to explain a phenomenon or some aspect of human experience (Littlejohn & Foss, 2008). There are two key theories that will be used in this study and are as follows:

DISRUPTIVE INNOVATION THEORY

Disruptive innovation theory provides an explanation as to why large, established companies eventually get overtaken by smaller ones, (Christensen, 1997). Brought to prominence by Professor Clayton Christensen's book *The Innovator's Dilemma* the concept of disruptive innovation was introduced. It theorises that small companies can disrupt the market of large companies by releasing a new version of an offering which appeals more to a subset of the customers. In many cases, the small company releases a new technology which is inferior in quality or performance to that of the large company, but makes up for it in another way, like a lower price or convenience (Christensen, 1997). The lower end of the market is the least profitable so managers tend to not be concerned with these smaller companies with their new technologies but over time and iteration, this new technology will begin improving to handle more demanding uses such as computer storage and dominate the entire market.

Most experts on disruptive innovation theory support the notion that businesses that do not technologically evolve and adapt using business innovation strategy remain stagnant in business as a whole and are thus unable to operate at a competitive level. This can be seen the most clearly through digitalization as technology encourages the digitalization of businesses and their business models. Digitalization is a global mega trend exemplified through cases such as Netflix, Kodak, Airbnb, Google, Facebook, Amazon, and Nokia (Ismail, 2014; Baiyere & Salmela, 2013; Gans 2016), and thus more and more business have disruptive innovative challenges and opportunities in the digital domain. Disruptive innovation is a threat to most businesses and an opportunity to others.

It is argued with digital cases like these, that disruption is happening with a still increasing speed (Ismail, 2014). The reason given is the exponential price/performance development of digital technologies; often doubling the price/performance between every one to two years, (Rosenstand, 2018). Applied to disruption theory the digital disrupter's trajectory moving up-market is driven by this exponential development of digital driven technologies resulting in digital disruption of incumbents (Rosenstand, 2018). This increase in the price/performance ratio is what inevitably renders businesses that do not technologically evolve and adapt using business innovation strategy stagnant as they are unable to operate at a competitive level because it is impossible to compete against something that is improving so quickly. If digital technologies double in performance and can decrease in price or manufacturing costs every one to two years, businesses that choose not to innovate and continue using the methods that are currently working for them will suddenly find themselves far behind the competition they were once ahead of. It is often the case that at this point it is too late to recover (Rosenstand, 2018).

An example to illustrate this point is the disruptive innovation of Blockbuster and Netflix. Blockbuster dominated the movie rental industry for years while Netflix, a much smaller company, operated in the same industry. At the end of the first decade of the 21st century, traditional linear television began a transformation process towards online television, which continues to this day. This evolution has allowed almost unlimited access to the content, without having to be subject to the programming grid of a television, now there is the possibility of seeing what you want, when and where you want (Suarez, 2019). Netflix identified where technological evolution was heading and pitched it to Blockbuster who declined and continued with their successful business model. They thought that the above generates a problem in the fragmentation of the audience, both for advertisers and for distributors, who affirm a sustainable business model and that an increase in the demand for content through television brings with it several disadvantages: the need to adapt to different screens and devices, the speed of connection, the location or the validation of the subscribers (Suarez, 2019). Blockbuster failed to identify that technological evolution would solve all these problems in the next few years with the subscription to video on demand (SVOD) model, as offered by Netflix becoming the new sustainable model (Suarez, 2019). There was no business innovation strategy from Blockbuster in relation to

technological evolution which resulted in them no longer being able to operate at a competitive level.

Business model innovation is a prime driver of the field at the present, through the business and management perspective. Business Model Innovation is about the effects of digital disruption and how this opens up new possibilities, which advocate for future research on digital disruption (Rosenstand, 2018). Business model innovation to combat disruptive innovation is a costly and time-consuming practice that requires large amounts of capital and risk (Snihur, 2020). This is a significant reason why businesses choose to not partake in business innovation strategy to combat technological evolution. If what they are currently doing is working for them, they don't see the need or benefits of change because of the risks involved and leave their business unchanged until it is too late.

However, some argue that disruptive innovation theory should be used very seldom. This might seem like a strange thing to say, but the most important thing to realise about disruptive innovation is that most people completely misinterpret it. Most start-ups state that their aim is to be disruptive or to disrupt a specific industry. The problem is that disruptive innovation is a force, not a tool. It has no predictive power. The theory mainly explains how large corporations were disrupted, not how a small company can guarantee success when faced with a larger competitor. Therefore, it is important to understand the basis of the theory from a defensive standpoint, to help prevent them from being disrupted (Skillicorn, 2017).

Disruptive innovation theory is relevant to this study because from the viewpoint of an already established business, they should constantly be engaging in business innovation strategy to run parallel with technological evolution because if left for too long, the rapid increase of technology will give these start-ups the opportunity to disrupt the industry and the established company will fade away from the competition.

TECHNOLOGICAL EVOLUTION THEORY

Technological evolution theory is a theory of radical transformation of society through technological development. This theory originated with Czech philosopher Radovan Richta (Stehr, 2012). An economic implication of the above idea is that intellectual labour will become increasingly more important relative to physical labour. Contracts and agreements around information will become increasingly more common at the marketplace. Expansion and creation of new kinds of institutes that works with information such as universities, bookstores, patent-trading companies, etc. is considered an indication that a civilization is in technological evolution, (Masse, 1993).

In the technology literature, a consensus has developed about the shape of technological evolution, and a consensus is emerging about the major explanation for this phenomenon. Regarding the phenomenon, prior research suggests that technologies evolve through an initial period of slow growth, followed by one of fast growth, and culminate in a plateau. When plotted against time, the performance resembles an S curve. Support for this phenomenon comes primarily from the work of Foster (1986), Sahal (1981), and Utterback (1994a). These authors address the progress of a technology on some primary dimension that is critical to consumers when the innovation emerges. Some examples of this are resolution in monitors and printers and recording density in desktop memory products. Subsequent authors have either accepted this view or found additional support for it (Sood, 2005).

Authors have not developed any single, strong, and unified theory for the S curve. However, an emerging, and probably the most compelling, explanation revolves around the dynamics of firms and researchers as the technology evolves. This explanation is called the technology life cycle because it explains the occurrences of three major stages of the S curve: introduction, growth, and maturity. The stages are described as emerging from the interplay of firms and researchers over the life of the technology (Sood, 2005).

Introduction stage: A new technological platform makes slow progress in performance during the early phase of its product life cycle. Two reasons may account for this: First, the technology is not well known and may not attract the attention of researchers. Second, certain basic but important bottlenecks must be overcome before any

new technological platform can be translated into practical and meaningful improvements in product performance. For example, the laser beam was a new platform that required much time and effort to achieve the safety and miniaturization required to use it as a surgical tool (Sood, 2005).

Growth stage: With continued research, the technological platform crosses a threshold after which it makes rapid progress. This stage usually begins with the emergence of a dominant standard around which product characteristics and consumer preferences coalesce (Utterback, 1974). That consensus stimulates research on the new platform, which in turn leads to improvement in its performance. Furthermore, publicity of the standardization draws a large number of researchers to study the new platform. Their cumulative and interactive efforts also lead to rapid increases in performance (Sood, 2005). The rapid progress leads to increases in sales of products based on the new technology, which increases revenues and profits and offers further support for research. In turn, these added resources fuel further improvement in performance (Klepper 1996).

Maturity stage: After a period of rapid improvement in performance, the new technology reaches a period of maturity after which progress occurs slowly or reaches a ceiling (Sood, 2005). Authors propose several reasons for this change. Foster (1986) suggests that maturation is an innate feature of each platform; a technology is good for only so much improvement in performance. Utterback (1994b) and Adner and Levinthal (2002) suggest that as a market ages, the focus of innovation shifts from product to process innovation. As such, performance increases are few and modest, leading to technological maturity. Reinganum (1985) and Ghemawat (1991) suggest that maturity occurs when there is less incentive for incumbent firms to innovate because of fears of obsolescence or cannibalization from a rival platform. Thus, the rate of innovation reduces relative to the growth stage. Perhaps the best explanation is that of Sahal (1981). He proposes that the rate of improvement in performance of a given technology declines because of limits of scale (i.e., things become either impossibly large or small) or system complexity (i.e., things become too complex to work flawlessly). When these limits are reached, the only possible way to maintain the pace of progress is through radical system redefinition—that is, a move to a new technological platform (Sood, 2005).

This theory is relevant to the study because why technology evolves, how it evolves and what companies should do when it evolves are all questions directly related to the topic and this theory, (Sood, 2005). The technology life cycle is relevant to companies who are deciding which stage is the optimal time to upgrade their technologies to the next level. If the development and progression of technology and its impact on society is not understood, then the problem of businesses that do not technologically evolve and adapt using business innovation strategy remaining stagnant will not be able to be answered effectively.

2.2 Previous Literature

Previous literature involves searching for available literature that is relevant and relates both directly and indirectly to the research topic. Literature is a broad term used to refer to all published information from textbooks journal articles and online material with the actual review aspect focusing on reading, summarising, and evaluating as much of the relevant information as possible (du Plooy-Cilliers, et al., 2018).

Theme 1: The importance of using strategic management and business innovation to keep up with technological evolution

Strategic management involves setting objectives, analysing the competitive environment, and the internal organization, using effective strategies, and ensuring that management rolls out the strategies across the organization (Vrontis, 2016). This is crucial when making large decisions in a company and the evidence supports the notion that the failure to innovate is a result of poor strategic management foresight.

Strategic process can provide an overall strategic direction to the management of an organization and gives a specific direction to areas like financial strategy, marketing strategy, organizational development strategy and human resources strategy, in order to achieve success. Innovation is the foundation of economic growth and corporate prosperity (Vrontis, 2016). No innovation parallel with technological evolution will limit economic growth and prosperity and as a result all other strategies will fail.

Most research supports the benefit of business innovation. Innovation generally refers to changing processes or creating more effective processes, products and ideas.

For businesses, this could mean implementing new ideas, creating dynamic products, or improving your existing services (Reuvid, 2019). Innovation can increase the likelihood of business success. Bringing innovation into a business can help save time and money and give the competitive advantage to grow and adapt a business in the marketplace (Reuvid, 2019).

Innovation is almost always a long-term strategy in the strategic management framework and all too often, leaders of business have a mindset which says, 'innovation is just some business school hype or marketing speak.' (Reuvid, 2019). The scepticism surrounding innovation is that it has little relevance to the day-to-day operation of the company even though it is strongly suggested the company vision or mission statement should include the intelligent intention to innovate. The company's long view must be accompanied by the short-term deliverable projects, which will become commercially viable and make a difference to clients and shareholders. It is argued that in all three areas of Mission, Strategic Goals and Operating Objectives there must be a stated and determined intention to innovate; not lip service, but an intelligent intention. The requirement for specific and short-term projects to produce commercial success is the test, which will prove whether the new product or process is truly innovative (Reuvid, 2019). The long-term nature and foresight needed for innovation may suggest reasons to why businesses don't find innovation to be a top priority.

The definition of innovation must include the commercial viability of the product, process, or service; just being new, or better, is not sufficient to achieve innovation. In order to move an idea or desire to produce an innovation, the firm's intention should be communicated to the entire organisation and potential clients which is a fundamental requirement for success. While the intention to innovate is often found in long-term mission statements, it is even more important in short-term, time constrained, projects (Reuvid, 2019). Commercial viability requires strategic management planning and foresight because what will be in demand in the future is not necessarily what is in demand currently.

Decades of research suggest that platform innovations come primarily from small firms or new entrants. These firms are ridiculed and ignored by incumbents in the beginning, but subsequently, they become successful with the progress of the new technology

(Sood, 2015). Scherer (1984) shows how new entrants contribute to a "disproportionately high share" of revolutionary industrial products. Previous studies proposed many reasons for large incumbents' failing to introduce innovations, including incumbents' technological inertia (Ghemawat 1991), complacency (Robertson, Eliashberg, and Rymon 1995), arrogance (Lieberman and Montgomery 1988), and unwillingness to cannibalize their current products (Chandy and Tellis 1998).

Using strategic management strategies to plan in advance can combat smaller company's releasing revolutionary industrial products and will combat the problem of businesses that do not technologically evolve and adapt using business innovation strategy remaining stagnant and are thus unable to competitively operate.

Theme 2: Technological changes and how they have a direct impact on a business.

It is important to understand how technology changes and how this directly effects businesses. Technological change is perhaps the most powerful engine of growth in markets today. To harness this source of growth, firms need answers the following questions about the dynamics of technological change; how new technologies evolve, how do rival technologies compete and how do firms deal with technological evolution. Some literature suggests that a new technology seems to evolve along an S-shaped path, which starts below that of an old technology, intersects it once, and ends above the old technology. A central premise is that performance of a new technology starts below that of an existing technology, crosses the performance of the older technology once, and ends at a higher plateau, thus tracing a single S-shaped curve. There is scattered empirical support for the premise and limited theoretical support for various aspects of the S-shape curve (Foster 1986; Utterback 1994). A central, practical problem that managers face is when to shift investments from the current to the future technology. If the S curve is indeed valid, the appropriate time would be the inflection point of the S curve. After this point, performance improves at a decreasing rate until maturity. This belief is based on scattered empirical evidence and some circular definitions (Sood, 2005).

However, research conducted in the 21st century with new data on 14 technologies from four markets, examining the shape and competitive dynamics of technological evolution suggests otherwise. The results contradict the prediction of a single S-curve. Instead, technological evolution seems to follow a step function, with sharp improvements in performance following long periods of no improvement. Moreover, paths of rival technologies may cross more than once or not at all (Sood, 2005). This is the dangerous trap most businesses fall into because they relax on business innovation strategy during periods of no improvement.

Technological change/innovation is perhaps the most powerful engine of growth. It fuels the growth of new brands (e.g., Gillette's Mach 3), creates new growth markets (e.g., digital video recorders), and transforms small outsiders (e.g., Intel) into market leaders (Chandy and Tellis 1998; Christensen 1997; Foster 1986). To date, the topic of technological evolution has been studied primarily in the technology management literature. (Sood, 2005). Belief in this premise is so strong that it has become almost a law in the strategy literature, from which authors have derived strong managerial implications. For example, they have warned that even though managers might be able to squeeze out improvement in performance from a mature technology at the top of its S curve, improvement is typically costly, short lived, and small. Thus, a primary recommendation in the strategy literature and the trade press is that managers should abandon a maturing technology and embrace a new one to stay competitive (Christensen 1997; Foster 1986). This point speaks to the core element of this study's problem. Businesses that mature their old technology for too long and do not partake in business innovation strategy as technology evolves will eventually lose its ability to compete in the market.

Sood (2005) concludes that the path of technological evolution seems partially predictable. Previous improvement in performance of the same technology, improvement or crossing by a rival technology, and especially crossing by a rival firm tend to signal immediate improvement in performance. The rate of technological change and the number of new technologies increase over time and new technologies come as much from new entrants as from large incumbents. Each new technology introduces a sequence of random, seemingly unpredictable secondary dimensions as a new basis of competition. Managers should use the partial ability to predict

technological evolution in their business innovation strategy to remain on par or ahead of the competition.

Theme 3: The impact globalisation has on technological evolution and why it encourages collaboration in a business

Globalisation is a force that is inevitable in today's age and cannot be ignored. With company's operation on a multinational scope, they need to be globally competitive in their business innovation strategy. They cannot always do this on their own. The term open innovation means a situation where an organisation doesn't just rely on their own internal knowledge, sources and resources (such as their own staff) for innovation of products, services, business models, and processes. While open innovation was first introduced as a robust concept in 2003, developments since have rendered open innovation an imperative in today's world. The first is that sources of knowledge have dispersed in many different places, and the geographic footprint of innovation is changing dramatically. Although patent quality is problematic, China in 2012 accounted for the largest number of patents filed throughout the world. According to the 2015 Global Innovation 1000 study, 94% of the world's largest innovators conduct some components of their research and development activities abroad. This means that companies should not rely solely on their own ideas and in-house research, but should also invite external sources to contribute, (Bogers, 2019). These contributions must act in conjunction with the business innovation strategy to remain on a competitive level.

Information property (IP) protection also matters for the other branch of open innovation: The Inside-Out branch—also referred to as outbound open innovation. One way to stimulate greater adoption of one's own technology is to provide others with access via licenses with reasonable royalties. Developing and scaling technologies requires a significant amount of risk-taking and capital, Inside-Out approaches can in many cases broaden the base of revenues to achieve this. Licensing regimes are supported with royalties at levels sufficient to draw forth the investment needed to make open innovation succeed (Bogers, 2019). This is an attractive option for businesses who are on the fence regarding business innovation and can act as an incentive to continuously partake in it.

The importance of innovation on a global scale becomes extremely obvious when compared directly to global collaborations such as artificial intelligence (AI). Arvind Krishna, director of IBM Research says, “Faced with a constant onslaught of data, we needed a new type of system that learns and adapts, and we now have that with AI”. Krishna further states, regarding the use of AI in business innovation, “What was deemed impossible a few years ago is not only becoming possible, it’s very quickly becoming necessary and expected”. In just the last decade AI has exploded because of the combination of big data with powerful graphics processing units (GPUs), which has benefited from employing the well-known model of Deep Learning. We all remember the stories of Deep Blue which was programmed by the forefathers of IBM Research back in the 20th century and which culminated in a competition with the Russian Chess Master, Gary Kasparov in 1996. It was IBM’s Deep Learning which allowed the computer to analyse the millions of chess moves and which revealed Artificial Intelligence as one of the most important technologies to be developed in the 21st century. (Reuvid, 2019)

Artificial Intelligence can be an important contributor to the innovative process. AI will complement, supplement and verify the human’s decisions and choices. The innovator must tune into and listen to the entire mind’s ecosystem when making a decision for it to be effective (Reuvid, 2019). It is clear that internal business innovation strategies alone are not enough by themselves to compete on an international level even if done continuously. A collaborate effort is needed, or stagnation and loss of competitive advantage is almost certain.

2.3 Conceptualisation

-Technology- Technology refers to the methods, systems, and devices which are the result of scientific knowledge being used for practical purposes. Technology has created a world of progress where small changes sometimes have dramatic results (Headrick, 2009).

-Evolution- Evolution is the gradual development of something, especially from a simple to a more complex form. Evolution has done more to revitalize human thinking during the past century than any other force (Cameron, 2018).

-Technological evolution- Technological evolution is the radical transformation of society through technological development. From an economic perspective intellectual labour will become increasingly more important relative to physical labour (Stehr, 2012).

-Innovation- Innovation is about staying relevant through the introduction of new ideas, methods, or things, (Shapiro, 2018). Innovations are distinguished from inventions, technology, and research, but may arise from any of the three, (Branscomb, 2001).

-Technological Innovation- Technological innovation is the successful implementation (in commerce or management) of a technical idea new to the institution creating it and it entails recognizing new technological possibilities, organizing the human and financial resources needed to transform ideas into useful products or processes, and carrying out the requisite activities, (Scherer, 2001).

-Innovation strategy- An innovation strategy is a plan used by a company to encourage advancements in technology or services, usually by investing money in research and development activities and when effective should add something unique to the product or service being developed (Kennedy, 2020). They are essential for companies that want to gain competitive advantage.

- Digitalisation- The process of converting information into a digital format. When the process is leveraged to improve business processes, such as advertising, it can be measured more easily and more accurately than traditional advertising (Singh, 2019).

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Paradigm

The term paradigm was coined after Thomas Kahn and describes a cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, how research should be done and how results should be interpreted and in social sciences can be referred to as world views, (Bryman, 2012).

There are three main paradigms namely positivism, critical realism and interpretivism. Positivism can simply be described as the approach of the natural sciences which focuses only on objective, observable and verifiable facts when considering natural and social phenomena, (du Plooy-Cilliers, et al., 2018). Interpretivism was developed due to the shortcomings of positivisms specific application to social sciences and argues that it does not make sense to study humans under a laboratory setting as there are always influences in the environment (du Plooy-Cilliers, et al., 2018). Critical realism is a result of frustration from positivism and interpretivisms very focused viewpoints and is a unique combination of different aspects from both traditions and proposes that our knowledge of reality is a result of social conditioning (Saunders, Lewis & Thornhill, 2007).

Positivism has the root word “positive” because early positivists has a very positive view of science and believed that it could enlighten people and make the world a better place through education and improvements. Positivism introduced the age of reasoning where thinkers only used observable, objective and verifiable facts when considering explaining natural and social phenomena instead of using myths and superstitions (du Plooy-Cilliers, et al., 2018).

The selected paradigm is positivism as this is a quantitative study and would benefit from the factual and numerical aspects positivism provides. There is a very limited amount of social science so objective facts and data will be the most useful to this study. As a result of the selected paradigm the positions of positivism are as follows: With epistemology the only valid knowledge is knowledge produced via empirical observation, with ontology reality is external and objective and the laws that govern it can be discovered and axiology is objective research, truth and reason are valued, (du Plooy-Cilliers, et al., 2018).

The study will be focusing on the factual reasoning of why businesses that do not technologically evolve and adapt using business innovation strategy remain stagnant and why they are unable to operate at a competitive level. Only positivism can accurately and successfully aid this study in its analysis because interpretivism would not provide enough information and critical realism would be unnecessary leaving positivism as the only option.

3.2 Research design/ Conceptual Approach

The two main research approaches are qualitative and quantitative methods of research. Quantitative methods of research present numerical or statistical data while qualitative research presents interpretive data, (du Plooy-Cilliers, et al., 2018). The quantitative method relies on measuring variables using a numerical system, analysing these measurements using statistical models, and reporting relationships and associations among the studied variables, (du Plooy-Cilliers, et al., 2018). The qualitative method is primarily exploratory research and is used to gain an understanding of underlying reasons, opinions, and motivations while providing insights into the problem, (du Plooy-Cilliers, et al., 2018). There is also a mixture of the two called the mixed methods approach which incorporates elements from both approaches.

A Quantitative approach will be taken for this study which will focus on objective, numerical data and generalisability linking to the positivism paradigm. The quantitative approach was chosen for this research study because the aims and objectives of this study are focused at understanding relationships of quantities and the significance of quantities rather than to understand, explore or to describe people's behaviour, trends, relationships or actions. The mix methods approach is too complex for this study and thus not necessary. The relationship between technological evolution and business innovation strategy requires a numerical and factual approach as figures will be more convincing and useful than opinions and beliefs for this study.

Descriptive statistics are used to draw inferences about populations and to estimate the parameters of those populations (Trochim, 2006) while inferential statistics are based on the descriptive statistics and the assumptions that generalize to the population from a selected sample (Trochim, 2006). This study will therefore be a

descriptive study because the researcher will use the data to provide descriptions of the population, either through numerical calculations or graphs or tables rather than making inferences and predictions. Similarly, deductive theorising will be used rather than inductive because this study will focus on testing existing theories with a reverse pyramid approach rather than the building of an existing theory (du Plooy-Cilliers, et al., 2018). Cross sectional research will also be used in this study as the aim is to create the picture of the phenomenon at this point in time.

3.3 Population

This section will focus on everything the population entails.

3.3.1. Population

A population in research is the total group of people or entities from whom information is required (Wiid and Diggins, 2013).

3.3.2 Units of analysis

The unit of analysis is what entity is being studied (du Plooy-Cilliers, et al., 2018). In this study it would be the information gathered from persons in middle to top management position and that are willing to participate. This information was used quantitatively to enhance the study.

3.3.3 Target and accessible population

The target population is the population that falls within the population parameters (du Plooy-Cilliers, et al., 2018). The target population for this study would be all persons who meet the parameters below in 2.6.3.1.2.

The accessible population refers to the population that can actually be included in the study (du Plooy-Cilliers, et al., 2018). The population that can be reached in this study will be persons that work in the middle to top level management of a company, fit the parameters and are willing to participate in the study by answering a survey. This population can be accessed online utilizing platforms such as survey monkey and Google forums.

3.3.4 Population parameters (characteristics)

The population parameters refer to the nature, size and unique characteristics of the population, (du Plooy-Cilliers, et al., 2018). This study will have the following population parameters: The nature of the population will be persons who work in a middle to top management position. The size of the population will be all persons who are in said positions and are willing to participate. The unique characteristics include persons that are: currently working for or own a business, the business must be

operating for over a year and the person should be working for the business for over a year.

3.4 Sampling

This section will focus on the sampling methods. A sample is a subset of the population that is considered to be representative of the population (Bradley, 2013). Quantitative research usually requires a representative sample which shares the characteristics of the larger population, (du Plooy-Cilliers, et al., 2018).

3.4.1 Probability or non-probability sampling

Probability sampling refers to whether each unit in the population has an equal opportunity to be part of the sample and is often used in quantitative studies as it removes the human bias from the sampling process, (du Plooy-Cilliers, et al., 2018). Non-probability sampling methods are used when it is nearly impossible to determine who the entire population is or when it is difficult to gain access to the entire population, and is suitable for qualitative research as the emphasis is not on the sample size but rather including enough participants that the data saturation point is reached, (du Plooy-Cilliers, et al., 2018). The probability sampling method will be used due to the quantitative nature of the study and the maximum size of 20 participants will be used to increase the accuracy of the study. The probability sampling method was chosen over the non-probability method because probability sampling is better for quantitative studies as the removal of human bias from the sampling process is crucial when collecting numerical data.

3.4.2 Sampling method

Sampling methods for probability sampling methods include simple random sampling, systematic sampling, stratified sampling and multi-stage cluster sampling. The sampling method that will be used for this research study is the simple random sampling method as this is the best method to ensure that the final sample is representative of the population, will be more effective to collect and will protect the study against bias (du Plooy-Cilliers, et al., 2018). This will be useful for this research

study because when each element of the population has the same and equal chance of being selected as part of the sample and can easily be done with computer software which this study will utilise (Neuman, 2011).

3.4.3 Sample size

The sample size is 20 participants as per the IIE guidelines for quantitative research. The reason for this is because qualitative research requires larger sizes.

3.5 Data collection

3.5.1 Data collection method(s)

Data collection is one of the most important aspects of a research study because if the data is collected incorrectly the results that follow will be invalid. Time is a crucial factor with data collection and therefore the placement in time, time span and overall time the actual research will take needs to be considered. A researcher also has to identify where the research will be taking place as this may affect conditions that are necessary for the study's data to be collected correctly, (du Plooy-Cilliers, et al., 2018). This research study is a current and cross-sectional study with a limited amount of time for it to be conducted.

Quantitative data collection techniques are unique to quantitative research and include surveys experiments and content analysis. Survey research is a data collection tool that consists of a series of questions designed to gather information about a significantly large group of people and is popular because it can provide a numeric or quantitative description of a phenomenon by asking a series of questions to sample respondents and generalising the results, (du Plooy-Cilliers, et al., 2018). Experimental designs have the basic intent of testing the effect of an intervention on an outcome. Researchers would usually randomly assign individuals to experimental and control groups and conduct the research itself which would involve manipulating a certain condition or set of conditions and will analyse the results, (du Plooy-Cilliers, et al., 2018). The last data collection technique is content analysis and is used to understand information as symbolic phenomena by investigating symbolic content information where the researcher attempts to describe the denotative meaning of content in an objective way, (du Plooy-Cilliers, et al., 2018).

Therefore, this study will be using survey research as the data collection technique specifically a cross sectional survey design because they provide a unique overall picture of a phenomenon at one point in time, (Maree, 2007). Surveys were selected over experimental designs and content analysis because the elements of the research study were more suited to surveys and the less complex nature.

Surveys using questionnaires are the type of survey that will be used because they are simple and quantifiable responses that stand a greater chance of attracting participants, (du Plooy-Cilliers, et al., 2018). The type of survey that was used will be

Mail surveys or online tools such as survey monkey or Google forms due to the outbreak of Covid-19 limiting the amount of contact researchers are able to have with participants. Mail surveys provide an inexpensive way to conduct research and require few human resources which are suitable for sensitive times such as these, however the time it will take to collect the data will be prolonged due to the participants completing the surveys in their own time, (du Plooy-Cilliers, et al., 2018).

Mail/online surveys were selected over other survey types such as personal interviews and group administration because this would require face to face contact which is uncertain at the present time. Platforms such as survey monkey and Google forms can be a helpful tool when using online surveys. Google forms was selected in the end because it is free and user friendly which also eliminates the small budget limitation of the study. Personal interviews also lack anonymity and are time consuming which are elements that this study requires. Group administration can also result in expensive printing costs which will be avoided in this study, (du Plooy-Cilliers, et al., 2018).

The surveys are scheduled to be given to participants in the early month of August and collection begin in late August. The surveys were designed with the hypothesis of "There is a positive relationship between technological evolution and business innovation strategy" in mind which will actively attempt to achieve the goals and purpose of the study which is to examine the extent to which technological evolution influences business innovation strategy.

3.5.2 Application of data-collection method(s)

The beginning of the data collection method process began with the designing and formulation of the data collection tool. Once a survey was determined to be the final data collection tool the researcher had a consultation with Stellan Lubinga to assist with the formulation of the questions. Because the hypothesis is “There is a positive relationship between technological evolution and business innovation strategy” the survey questions were designed around finding an effective measure to make a conclusion once the data is analysed. This resulted in the construction of 7 questions with the following reasoning behind them:

<u>Question1</u> Which one of the following statements represent your current understanding of technological evolution?	This question aims to gain an understanding of what the participant believes technological evolution is with only one correct answer. (Multiple choice)
<u>Question 2</u> Which one of the following statements represent your current understanding of business innovation strategy?	This question aims to gain an understanding of what the participant believes business innovation strategy is with only one correct answer. (Multiple choice)
<u>Question 3</u> Does your business use a business innovation strategy?	This yes or no question will help determine the importance of business innovation to the participant.
<u>Question 4</u> How would you describe your company's business innovation strategy?	This is the only open-ended question that allows the participant to fully describe what they do at their company.
<u>Question 5</u> How would you rate you company's business innovation strategy based on the following classifications?	Four classifications are given so the researcher is aware what type of business innovation is being used.
<u>Question 6</u> Would you say there was a relationship between technological evolution and business innovation strategy?	This is arguably the most important question that will aid in answering the hypothesis.

<u>Question 7</u> To what extent has technology evolution impacted your current company's business innovation strategy? (0-Not at all; 1- To a small extent; 2-To some extent; 3-A moderate extent; 4-To a great extent; 5-To a very great extent)	This Linkert scale question will help to gauge whether the relationship is positive or negative once again aiding in proving or disproving the hypothesis.
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As it can be seen every question is directly aimed at either proving or disproving the hypothesis and fulfilling the goal and purpose of the study. Once these questions were finalised and the survey was completed it was decided that the Google forums would be used to simplify the survey data collection and analysis process. The questions were transferred into a Google forums document and a link was created that would take participants onto the Google forum page to answer the questions.

The researcher sent an email to four top level managers of four different South African, Gauteng based businesses that fit the parameters of the study with a consent from attached which can be seen in addendum A. The managers were asked to please distribute the link of the survey to employees in their business who were competent enough to be able to answer the survey accurately. Four different business were used because in order to get the 20 responses to meet the qualitative data requirements there needed to be a large amount of participants receiving the link to the survey because only a fraction of people end up doing them.

There was no amount of time given for participants to complete the survey in the hopes of encouraging participation and when a single survey was completed it was automatically uploaded to Google forums. The researcher kept a close eye on the amount of surveys that were completed and on the 4th day of the surveys being issued (26 August 2020) when the 20th survey was submitted, Google forums was set to "No longer accepting responses" so no more surveys would be included in the data analysis. To ensure that there was no bias the survey did not record who the participants were or which company they came from which falls in line with the simple random sampling method that was chosen. The researcher now had 20 completed surveys that could now be analysed.

3.6 Data analysis

3.6.1 Data analysis method(s)

The first stage of data analysis will be conducted which is data preparation, where the aim is to convert raw data into something meaningful and readable and consists of data validation, data editing and data coding. Statistical analysis methods are data analysis methods that can be useful when correctly applied and allows for a researcher to prove or disprove through believable and defensible statistical results, (du Plooy-Cilliers, et al., 2018). Inferential statistics are complex analyses that show the relationship between several different variables, rather than describing a single variable. Descriptive statistics are usually used in presenting a quantitative analysis of data in a simple way and will therefore be used in this quantitative study. The main purpose of descriptive statistics is to provide a brief summary of the samples and the measures done on a particular study coupled with a number of graphics analysis, descriptive statistics form a major component of almost all quantitative data analysis (A Research Guide, 2019).

Therefore, descriptive statistics will be used in this study because it is vital in presenting data in a manner that can be easily visualized by people. The three main areas will be utilised namely the distribution, the measure of central tendency and the dispersion. The distribution is a summary showing the frequency of single values of the ranges of a variable (A Research Guide, 2019). Central tendency involves determining the value at the centre of a distribution which can be in the form of a mean, median or mode, (A Research Guide, 2019). Lastly dispersion is a term used to describe how values have spread around the central tendency and the most useful way of expressing this spread of data is in the form of standard deviation or range. Percentages will be the main focus of the data analysis.

Once data is gathered the three main area, with the use of percentages will be used to analyse the data to expose patterns in the findings. The researcher will then interpret this data and format it into summaries and graphical representations which will be done automatically by the Google forum software. The projections that are derived from this data will then be provided to conclude a systematic data analysis (du Plooy-Cilliers, et al., 2018).

3.6.2 Application of data analysis method(s)

In accordance with quantitative data analysis the first stage of analysing data is data preparation, where the aim is to convert raw data into something meaningful and readable. The first step Data Validation has the purpose to find out, as far as possible, whether the data collection was done as per the pre-set standards and without any bias. The data in this study is up to standard with no bias because the software used in combination with the collection method previously discussed made it impossible for there to be any inconsistencies or bias. All of the data was recorded automatically by Google forms and the graphs were auto generated from the responses. A setting was selected in Google forms that made it impossible for the researcher to identify which surveys came from specific candidates to avoid any form of bias.

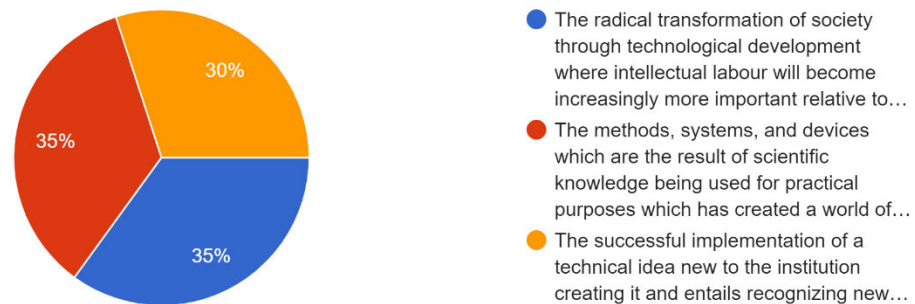
The second step is data editing and is there to ensure that the typical errors that are present in some data sets are not present in the study. Examples can include respondents that may fill fields incorrectly or skip them accidentally. To make sure that there are no such errors, it is often recommended that the researcher conduct basic data checks, check for outliers, and edit the raw research data to identify and clear out any data points that may negatively impact the accuracy of the results. Data editing was done automatically in this study due to the intelligent software present in google forms. It was not possible to complete and submit the survey without all the fields being correctly filled in. The software also confirmed that all 20 participants in the study answered all 7 questions, so it was not possible for the data to be incorrect as it was all done automatically.

The last step is data Coding which is considered to be one of the most important steps in data preparation and refers to grouping and assigning values to responses from the survey. Once again this was automatically done by the Google forum software which grouped similar answers together and assigned them a value in percentages. This also ensures that the grouping and value assigning was done instantly and correctly as there is no opportunity for human error.

An example of a question from the data analysis will now be examined:

Which one of the following statements represent your current understanding of technological evolution?

20 responses



In this question the aim was to identify what the participants understanding of technological evolution was. One correct answer was given with another two different definitions describing similar terminology to identify who actually knew the true definition. It is clear that the data is split almost evenly between the three definitions which may suggest that most participants do not actually know the true definition of technological evolution.

35% of participants were able to identify the actual conceptualisation of technological evolution which is represented by the blue section on the pie chart. 35% of participants believed that the conceptualisation for technology was technological evolution represented by the red portion of the pie chart and 30% of participants believed that the conceptualisation for technological innovation was technological evolution represented by the yellow section.

These concepts are closely related but this does highlight the fact that only 35% of participants could accurately differentiate between technological evolution and other concepts relating to technology. All application for data analysis can be found in annexure B.

4. FINDINGS AND INTERPRETATION OF FINDINGS

The research study began with the purpose to examine the extent to which technological evolution influences business innovation strategy. This ultimately created the research question of this study which was **“to what extent will technological evolution influence business innovation strategy?”**. The research question will be analysed through the data of the findings which will be supported by and directly relate to the literature and theories of the study. Finally, the hypothesis of the study was **“There is a positive relationship between technological evolution and business innovation strategy”**. The hypothesis will also be discussed in the findings to determine whether the percentages provided by the data indicate a positive negative or neutral relationship between technological evolution and business innovation strategy which will ultimately suggest that they hypothesis can be proved or disproved.

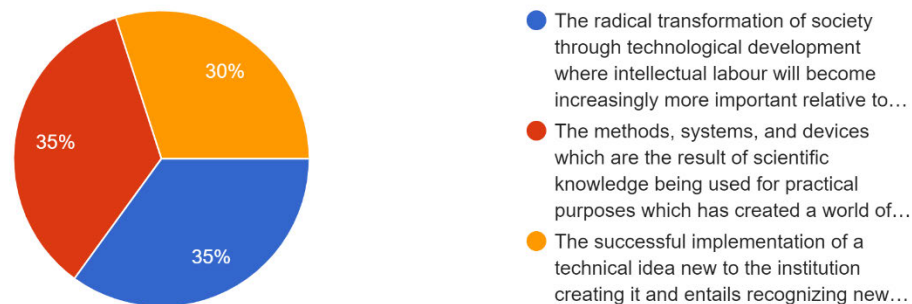
Interpretation

The interpretation of the data relating to the research question, hypothesis and literature will now take place question by question.

Figure 1.1

Which one of the following statements represent your current understanding of technological evolution?

20 responses



In this question the aim was to identify what the participants understanding of technological evolution was. One correct answer was given with another two different definitions describing similar terminology to identify who actually knew the true definition. It is clear that the data is split almost evenly between the three definitions which may suggest that most participants do not actually know the true definition of technological evolution.

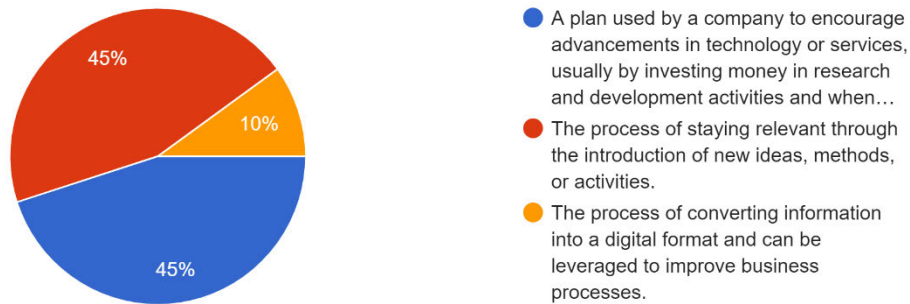
35% of participants were able to identify the actual conceptualisation of technological evolution which is represented by the blue section on the pie chart. 35% of participants believed that the conceptualisation for technology was technological evolution represented by the red portion of the pie chart and 30% of participants believed that the conceptualisation for technological innovation was technological evolution represented by the yellow section. These concepts are closely related but this does highlight the fact that only 35% of participants could accurately differentiate between technological evolution and other concepts relating to technology. With 65% of participants failing to conceptualise technological evolution this may highlight one of the key elements of the research problem which is the rapid growth of technology that almost sneaks up on businesses that are not completely up to date with the available knowledge. Technological evolution theory suggests that technologies evolve through an initial period of slow growth, followed by one of fast growth, and culminate in a

plateau (Foster, 1986). The fact that most participants are unable to identify the concept suggests that they are at high risk of not being able to combat the phenomenon once the fast growth period occurs in their particular industry.

Figure 1.2

Which one of the following statements represent your current understanding of business innovation strategy?

20 responses



In this question the aim was to identify what the participants understanding of business innovation strategy was. Based on the responses it is clear that there is a better understanding of business innovation strategy however there is still a 55% majority that were unable to correctly provide the correct understanding. 45% of participants could correctly describe business innovation strategy which represents the blue section of the pie chart. Another 45% of participants provided the definition of innovation represented by the red section of the pie chart and the remaining 10% provided the definition of digitalisation as their answer represented by the orange section of the pie chart. The 45% that answered incorrectly were still able to identify the theme of innovation in their answer however the 10% who described digitalisation demonstrate a low understanding of the business innovation strategy.

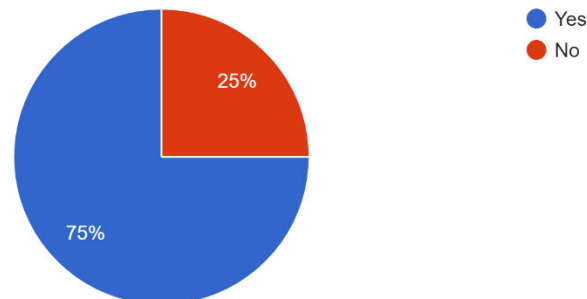
With 55% of participants providing the incorrect conceptualisation of a business innovation strategy, this question highlights one of the core problems mentioned in the research problem which is the slacking of the business innovation strategy. 55% of the participants failing to successfully identify the very concept of business innovation strategy suggests that those businesses innovation strategies won't be very high in quality. Although this is speculative less than half (45%) of participants successfully conceptualised business innovation strategy which creates the problem that Sood (2005) discussed when he concluded that the path of technological evolution seems partially predictable but businesses often fail to do so because they are not performing as well as they think they are. In this case if a business innovation strategy cannot be

correctly conceptualised the question of how good their innovation strategy can possibly be must be asked.

Figure 1.3

Does your business use a business innovation strategy?

20 responses

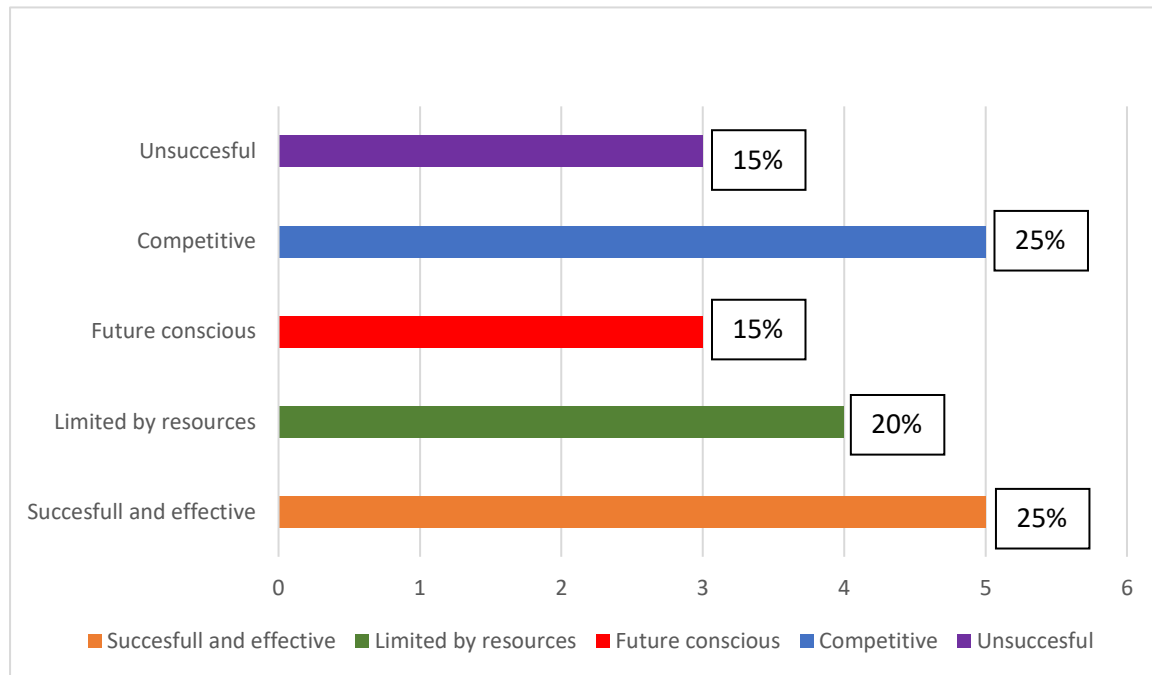


This question aimed to determine how many of the participants were actively using an innovation strategy in their business. 75% of participants claim that their business uses an innovation strategy represented by the blue section of the pie chart. 25% of participants do not have an innovation strategy in their business which is represented by the red section of the pie chart. The majority of the participants businesses are using innovation strategy's however with 75% of participants claiming to be using innovation strategy's and only 45% of participants correctly describing innovation strategy in the previous question may highlight a concern.

Assuming that the businesses are using a true innovation strategy that is of a high quality only 25% of the participants are at a high risk of succumbing to the research problem. They are at risk of both theories mentioned, the disruptive innovation theory and technological evolution theory because if there is nothing to combat the high risks of the theories such as a business innovation strategy they will most certainly face all the negative repercussions of the research problem when one of the theories inevitable comes into reality (Snihur, 2020). The remaining 75% are on track to combatting the research problem however the success will be based off what the research question is asking which is the extent to which business innovation strategy influences technological evolution. The poor answer from figure 1.2 should also be taken into account when determining if the participants have a true understanding of innovation strategy and if they are actually implementing a business innovation strategy specifically.

Figure 1.4

How would you describe your company's business innovation strategy?



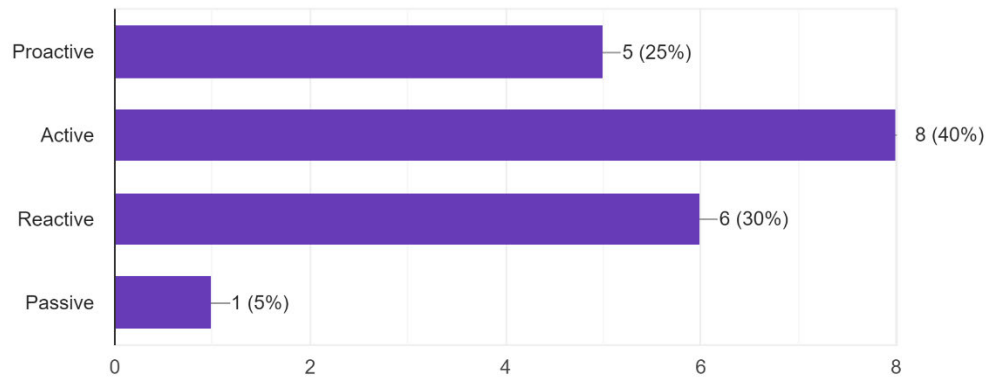
This question asked the participants to describe their innovation strategy in an attempt to see if it was positive, negative, or neutral. This was the only open-ended question which has been condensed into the following five themes. 15% (Purple) stated it was unsuccessful, which is the only negative description. 20% (Green) stated that it was limited by resources such as capital and time and can be considered neutral; however, if not limited, it would most likely be positive. 15% (Red) stated that it was preparing their companies for the future, 25% (Blue) stated that it made them more competitive, and 25% (Orange) stated that they noticed it was effective or providing them success. Based on this, 15% can be considered negative, 20% can be considered neutral, and the remaining 65% provided positive feedback of their business's innovation strategy. This partly answers the hypothesis suggesting that there is a positive relationship between technological evolution and business innovation strategy.

The literature also suggests a positive relationship as described in Theme 2, where technological evolution has been studied primarily in the technology management literature and shows a positive relationship with managers who implement innovation strategies to combat technological evolution (Sood, 2005).

Figure 1.5

How would you rate you company's business innovation strategy based on the following classifications?

20 responses



This question aimed to identify what classification participants gave to their company's business innovation strategy. 25% are proactive, 40% are active, 30% are reactive and 5% are passive. The question is aiming to see what classification participants follow which will not only aid in identifying the risk they have to the research problem but will aid in the wholistic understanding needed to answer the research question and hypothesis. The literature suggests that proactive strategies are strong in research orientation, hold first-mover advantage, and can potentially be technology market leaders (25%). Active innovation strategies involve defending existing technologies and markets while being prepared to respond quickly once markets and technologies are proven (40%). Reactive strategies only follow and copy proven innovation and use entirely incremental innovators (30%). Passive innovation strategies wait until their customers demand a change in their products or services (5%) (Dodgson, 2008).

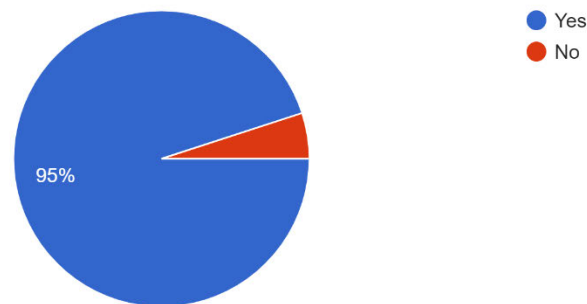
Based on previously discussed disruptive innovation theory and technological evolution theory it was identified that the businesses who are most at risk are the slow or non-responders to technological evolution with an innovation strategy. The research problem also highlights this fact and forms the basis of the purpose of the study. The 25% of proactive and 40% of active participants are at a low risk of the research problem and are ahead of their competition based on the speed and research base of their strategies. However the remaining 35% are using strategies that put them at extreme risk of the research problem as these innovation strategies might be in place but have a low probability of being quick or informative enough to keep up with the

competition once the growth phase begins (Foster, 1986). With that said 65% are following effective strategies to combat the research problem.

Figure 1.6

Would you say there was a relationship between technological evolution and business innovation strategy?

20 responses



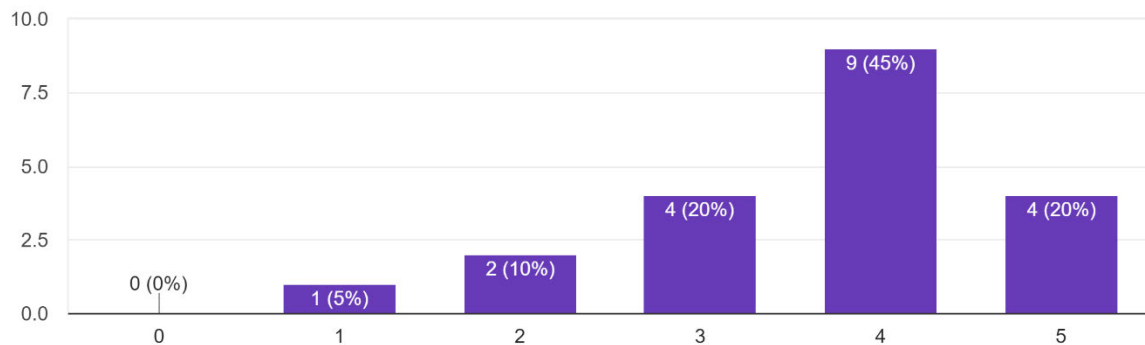
This question attempted to directly answer the hypothesis by asking participants if they thought there was a relationship between technological evolution and business innovation strategy. The positive or negative aspect was excluded as other questions will lead the researcher to determine this and to remove bias. A majority 95% of participants believed that there was a relationship represented by the blue section of the pie chart and only 5% believed that there was no relationship which is represented by the red section of the pie chart. This is conformation that in this study there is definitely a relationship between the two because an overwhelming majority (95%) believe that there is one. Which partially answers the research question and hypothesis just leaving the extent and positive or negative aspects.

The fact that there is a relationship is a conformation to what the literature suggests as both disruptive innovation theory and technological innovation theory suggest that business innovation strategy can be used to combat the risks of technological evolution (Snihur, 2020). Furthermore Theme 1 suggests a relationship with regards to bringing innovation into a business which can not only combat the negative effects of technological evolution but create a competitive advantage to grow and adapt a business in the marketplace (Reuvid, 2019). The findings confirm the literature and provide a portion of the answer to the research question and hypothesis. Figure 1.6 suggests that there is a relationship, and the extent is determined in figure 1.7.

Figure 1.7

To what extent has technology evolution impacted your current company's business innovation strategy? (0-Not at all; 1- To a small extent; 2-To s...tent; 4-To a great extent; 5- To a very great extent)

20 responses



The final question attempted to directly address the research question of the study which would also help determine if there was a positive or negative relationship of technological evolution and business innovation strategy in the hypothesis. 0% of participants believe that there is no relationship at all, 5% of participants believed that there was a small extent, 10% of participants believed that there was some extent, 20% believed that there was a moderate extent, 45% the majority answer believed that there was a great extent and the final 20% believed that there was a very great extent of impact. With 65% believing there is a great or very great extent and a further 20% believing there is a moderate extent suggests that most participants (85%) believe that technological evolution has significantly impacted their company's business innovation strategy. Based on this information the answer to the research question would suggest that technological evolution influences business innovation strategy to great extent based on the overwhelming majority of participants answering within this range on the scale with only 15% suggesting otherwise. With 45% answering a great extent and another 40% answering either moderate or very great this seems to be a reasonable conclusion.

This also confirms what the literature is stating because a similar conclusion was reach when it was determined that the lack of a successful business innovation strategy running in parallel with technological evolution directly impacted Blockbuster in a negative way as seen in the disruptive innovation theory which suggests a great extent of impact between technological evolution and business innovation strategy (Suarez, 2019).

5. VALIDITY AND RELIABILITY

Validity, reliability

Validity and reliability are linked to quantitative studies and are insured through reliable research tools, large sample sizes and random sampling. When researchers use the terms reliability and validity, they are applied differently (du Plooy-Cilliers, et al., 2018). Reliability and validity applying to the study are as follows:

Reliability

Reliability is linked to the findings of the research and is about credibility of the research which requires consistency. For the method or instrument to be considered reliable the same results will need to be replicated in the study is repeated, (du Plooy-Cilliers, et al., 2018). This study will utilize the inter-rater type of reliability which is a measure of agreement because the same methods and instruments will be used on different participants (du Plooy-Cilliers, et al., 2018). The survey questions will all remain the same.

Validity

Validity is about determining what was measured and if it was what the research was supposed to measure and if the findings reflect what is happening in the situation (du Plooy-Cilliers, et al., 2018). This study will ensure that the internal and external validity is achieved. The internal will answer the research question through the design and the external will focus on generalizing the findings from the 20-sample size to the larger population. The validity will ensure the continuation of the golden thread.

6. CONCLUSION

6.1 Summary of findings as they relate to the research question, problem, hypotheses

Finding 1

Based off question 1 the concept of technological evolution is not fully understood by most participants. This suggests that they are at high risk of not being able to combat the phenomenon once the fast growth period occurs in their particular industry due to the lack of in depth understanding of this key concept. Similarly, in question 2 the concept of a business innovation strategy is not fully understood by most participants which highlights one of the core problems mentioned in the research problem which is the slacking of the business innovation strategy. These findings suggest that the conclusion of Sood (2005) are applicable in this study because the path of technological evolution is partially predictable but businesses often fail to do so because they are not performing as well as they think they are which is present in these findings. Participants may be overestimating how knowledgeable they are in these concepts.

Finding 2

Question 3 highlights the fact that most participants are on track to combatting the research problem however the success will be based off what the research question is asking which is the extent to which business innovation strategy influences technological evolution. The poor answer from figure 1.2 should also be taken into account when determining if the participants have a true understanding of innovation strategy and if they are actually implementing a business innovation strategy specifically.

Finding 3

Question 4 partly suggests an answer to the hypothesis suggesting that there is a positive relationship between technological evolution and business innovation strategy because 65% provided positive feedback of their business's innovation strategy. The literature also suggests this positive relationship.

Finding 4

Question 5 findings suggest that majority of the participants are following effective strategies to combat the research problem. There are however still participants that are at a high a high risk of the research problem.

Finding 5

The findings in question 6 confirm the literature and provide a portion of the answer to the research question and hypothesis. Figure 1.6 suggests that there is a relationship, and the extent is determined in figure 1.7. Furthermore Theme 1 suggests a relationship with regards to bringing innovation into a business which can not only combat the negative effects of technological evolution but create a competitive advantage to grow and adapt a business in the marketplace (Reuvid, 2019).

Finding 6

Based on the findings of question 7 it would suggest that technological evolution influences business innovation strategy to great extent based on the overwhelming majority of participants answering within this range on the scale answering the research question and confirming the literature.

Conclusion

This research study conducted research which had the purpose to examine the extent to which technological evolution influences business innovation strategy. It was hypothesised that there is a positive relationship between technological evolution and business innovation strategy. The study then proceeded to gather pre-existing information and new information through data collection tools which resulted in an in depth analysis.

An analysis was conducted on the findings of the data provided by participants and the percentages were interpreted in terms of previous literature and theories, the research question and hypothesis. Figure 1.4 and 1.6 provided a detailed understanding that can be used to answer the hypothesis and Figure 1.7 and 1.5 can be useful when attempting to answer the research question. Based on the analysis of the findings it can be suggested that the hypothesis is correct as all the literature and

statistical data is pointing to that direction and the research question is “to a great extent”. Within the context of this study the results suggest to conclusively point in this direction.

6.2 Anticipated contribution

An anticipated contribution is often criticised for pre-empting or predicting the findings of a study prematurely, however this study believes it is useful to highlight the contribution it can possibly make to the existing body of knowledge, (du Plooy-Cilliers, et al., 2018).

This study will highlight the relationship of technological evolution and business innovation strategy by proving a reader of the study with clear and scientific information between the connection of the two. Regardless of the results an understanding of the connection will be useful to the reader and the body of knowledge will have a study that adds to the large amount of scattered knowledge about the topic that takes a more focused approach. At the very least a person reading the study can gain an understanding that there is a clear relationship between the two elements which is most likely positive.

6.3 Ethical considerations

The researcher who acts with integrity adheres to ethical principles and professional standards that are essential for practising research in a responsible way (du Plooy-Cilliers, et al., 2018). The researcher will consider all ethical issues during the duration of the research study and will avoid falsifying information, destroying results, allowing bias to influence interpretation, misusing information and using inappropriate research methods. The researcher will stay true to the elements of quantitative data and be completely objective when showcasing numerical data and generalisability. No surveys will take place without full transparency, consent, and confidentiality. Due to the recent outbreak of Covid-19 nothing will be done through the duration of the study which would endanger or put any participant at risk such as engaging in face to face interviews or group administrations even though it is not necessary to this study.

It is acknowledged in this study that there are other stakeholders involved and ethical principles will always be upheld with them. The researcher will behave ethically with the following relevant stakeholders. The IEE as it is an academic institution whose name needs to be upheld as their reputation cannot be tainted. The participants of the project as they should not be misled or exploited. The research community as they rely on the researcher as a credible and reliable source and lastly the researcher themselves as their personal and professional reputations are at stake. This can all be done by avoiding deception, understanding confidentiality versus anonymity, and always avoiding harm (du Plooy-Cilliers, et al., 2018).

6.4 Limitations

Limitations are often described as the limits or constraints of a study that are out of the researcher's control. This could include limited time, funding or information and can cause the scope of the research to be redefined (du Plooy-Cilliers, et al., 2018).

Limitations to this study could include the reliability of numerical data that was made public and used in the study and the limited amount of accurate feedback that is expected. A business will very rarely admit to fault or any negative associations so the feedback may not be completely honest. There is also no funding and a limited amount of time that may impact the studies full potential.

The willingness of businesses to participate in this study in this current unprecedented environment also limited the studies reach. Covid-19 has created numerous complications because even though the study is quantitative and does not require in person interviews, there is a sample size of 20 participants which was more challenging to achieve as there was limited amounts of free time in businesses currently to partake in activities such as student research.

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8. ANNEXURES

8.1 Annexure A – Consent Form

EXPLANATORY INFORMATION SHEET

To whom it may concern,

My name is Brendan Muller, and I am a student at Varsity College. I am currently conducting research under the supervision of Stellah Lubinga about the extent to which technological evolution influences business innovation strategy. This study will highlight the relationship of technological evolution and business innovation strategy by proving a reader of the study with clear and scientific information between the connection of the two.

I would like to invite you to participate in my study. In order to explain to you what your participation in my study will involve, I have formulated questions that I will try to fully answer so that you can make an informed decision about whether or not to participate. If you have any additional questions that you feel are not addressed or explained in this information sheet, please do not hesitate to ask me for more information. Once you have read and understood all the information contained in this sheet and are willing to participate, please complete and sign the consent form below.

What will I be doing if I participate in your study?

I would like to invite you to participate in this research because you fit the criteria to be included in the research.

You can decide whether or not to participate in this research. If you decide to participate, you can choose to withdraw at any time or to decide not to answer particular survey questions.

Do I have to participate in the study?

- Your inclusion in this study is completely voluntary;
- If you do not wish to participate in this study, you have every right not to do so;
- Even if you agree to participate in this study, you may withdraw at any time without having to provide an explanation for your decision.

Will my identity be protected?

I promise to protect your identity. I will not use your name in any research summaries to come out of this research and I will also make sure that any other details are disguised so that nobody will be able to identify you. Nobody else, including anybody at Varsity College, will have access to your interview information. I would like to use

quotes when I discuss the findings of the research but I will not use any recognisable information in these quotes that can be linked to you.

What will happen to the information that participants provide?

Once all surveys are completed, I will write summaries to be included in my research report, which is a requirement to complete my Honours in business management. You may ask me to send you a summary of the research if you are interested in the final outcome of the study.

What happens if I have more questions about the study?

Please feel free to contact me or my supervisor should you have any questions or concerns about this research, or if there is anything you need to know before you decide whether or not to participate.

You should not agree to participate unless you are completely comfortable with the procedures followed.

My contact details are as follows:

Brendan Muller

The contact details of my supervisor are as follows:

Consent form for participants

I, _____, agree to participate in the research conducted by Brendan Muller about the extent to which technological evolution influences business innovation strategy.

This research has been explained to me and I understand what participation in this research will involve. I understand that:

1. I agree to be interviewed for this research.
2. My confidentiality will be ensured. My name and personal details will be kept private.
3. My participation in this research is voluntary and I have the right to withdraw from the research at any time. There will be no repercussions should I choose to withdraw from the research.

4. I may choose not to answer any of the questions that are asked during the research interview.

5. I may be quoted directly when the research is published, but my identity will be protected.

Signature Date

8.2. Annexure B – Questionnaire

The impact of technological evolution on business innovation strategy.

I am currently conducting research under the supervision of Stellah Lubinga about the extent to which technological evolution influences business innovation strategy. This study will highlight the relationship of technological evolution and business innovation strategy.

1. Which one of the following statements represent your current understanding of technological evolution?

Mark only one oval.

- ☐ The radical transformation of society through technological development where intellectual labour will become increasingly more important relative to physical labour.
- ☐ The methods, systems, and devices which are the result of scientific knowledge being used for practical purposes which has created a world of progress.
- ☐ The successful implementation of a technical idea new to the institution creating it and entails recognizing new technological possibilities.

2. Which one of the following statements represent your current understanding of business innovation strategy?

Mark only one oval.

- ☐ A plan used by a company to encourage advancements in technology or services, usually by investing money in research and development activities and when effective should add something unique to the product or service being developed.
- ☐ The process of staying relevant through the introduction of new ideas, methods, or activities.
- ☐ The process of converting information into a digital format and can be leveraged to improve business processes.

3. Does your business use a business innovation strategy?

Mark only one oval.

- ☐ Yes
- ☐ No

4. How would you describe your company's business innovation strategy?

5. How would you rate you company's business innovation strategy based on the following classifications?

Check all that apply.

- ☐ Proactive
☐ Active
☐ Reactive
☐ Passive

6. Would you say there was a relationship between technological evolution and business innovation strategy?

Mark only one oval.

- ☐ Yes
☐ No

7. To what extent has technology evolution impacted your current company's business innovation strategy? (0-Not at all; 1- To a small extent; 2-To some extent; 3-A moderate extent; 4-To a great extent; 5- To a very great extent)

Mark only one oval.

	0	1	2	3	4	5	
Not at all	☐	☐	☐	☐	☐	☐	To a very great extent

8.3. Annexure C – Ethical Clearance Letter



24 JULY 2020

Student name: Bredan Muller

Student number: 17001738

Campus: IIE's Varsity College

Re: Approval of Bachelor of Commerce Proposal and Ethics Clearance

HONOURS ETHICAL CLEARANCE LETTER

Your research proposal and the ethical implications of your proposed research topic were reviewed by your supervisor and the campus research panel, a subcommittee of The Independent Institute of Education's Research and Postgraduate Studies Committee.

There are some aspects that you still need to address in your proposal. You will need to address these aspects in consultation with your supervisor before you may proceed (see below):

Please discuss with your supervisor/navigator/lecturer how you will address these issues listed below:

Please note: **Your fieldwork may only proceed once you address the following issues:**

- Your final interview schedule/questionnaire is missing or needs refinement. Your supervisor needs to sign off your final interview schedule or questionnaire.
- Your letter of consent is absent or not sufficient. Please resubmit.
- Title suggestion – *The impact of technological evolution on a business innovation strategy in Johannesburg, South Africa.*

In the event of you deciding to change your research methodology in any way, kindly consult your supervisor to ensure all ethical considerations are adhered to and pose no risk to any participant or party involved. A revised ethical clearance letter will be issued.

GENERAL CONDITIONS TO BE FULFILLED IN RELATION TO RESEARCH

Permission is granted to proceed with the above study subject to the conditions listed below being met and may be withdrawn should any of these conditions be flouted.

Please note: The panel has not considered the merits, accuracy or ethical soundness of the research. The only merits examined are the use of The IIE as a sample.

Permission is granted subject to the following conditions:

1. The researcher(s) will need to obtain informed consent in writing from all of the participants in his/ her sample if the study is not anonymous.
2. The researcher(s) may only use the data collected for research purposes and in no other way.
3. Photographs of human subjects may only be taken if relevant to the research, informed consent was obtained, and even with informed consent, the photographs may not be published on any online platforms.
4. The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.
5. No names or identifying information of participants may be used within the research and the research must be voluntary.
6. Please make it clear that the information will not be used punitively in any way and participants may in no way be counselled/advised based on this.

Supervisor:

DR STELLAH LUBINGA

Campus Postgraduate Coordinator (CPC):

JENNA-LEE RAMNARAIN

DECLARATION BY THE RESEARCHER			
1. I declare that all statements made by myself in this application are true and accurate.			
2. I accept the conditions associated with the granting of approval to conduct research and undertake to abide by them.			
Signature:			
DECLARATION BY SUPERVISOR / LECTURER / ETHICS COMMITTEE			
I declare that: (Name of Researcher) Brendan Richard Muller			
1. Is enrolled at the institution/ employed by the organisation to which the undersigned is attached.			
2. That the research proposal and or study has been approved by the Ethics Committee of The Independent Institute of Education.			
3. The questionnaires / structured interviews / tests meet the criteria of: • Educational Accountability; • Proper Research Design; • Sensitivity towards Participants; • Correct Content and Terminology; • Acceptable Grammar; • Absence of Non-essential / Superfluous items.			
Surname:			
First Name/ s:			
Institution/ Organisation:			
Faculty/ Department (where relevant):			
Telephone:		Email:	
Signature:		Date:	

8.4. Annexure D – Examples of Data Collected

10/28/2020

The impact of technological evolution on business innovation strategy.

The impact of technological evolution on business innovation strategy.

I am currently conducting research under the supervision of Stella Lubinga about the extent to which technological evolution influences business innovation strategy. This study will highlight the relationship of technological evolution and business innovation strategy.

Which one of the following statements represent your current understanding of technological evolution?

- ☐ The radical transformation of society through technological development where intellectual labour will become increasingly more important relative to physical labour.
- ☒ The methods, systems, and devices which are the result of scientific knowledge being used for practical purposes which has created a world of progress.
- ☐ The successful implementation of a technical idea new to the institution creating it and entails recognizing new technological possibilities.

Which one of the following statements represent your current understanding of business innovation strategy?

- ☐ A plan used by a company to encourage advancements in technology or services, usually by investing money in research and development activities and when effective should add something unique to the product or service being developed.
- ☒ The process of staying relevant through the introduction of new ideas, methods, or activities.
- ☐ The process of converting information into a digital format and can be leveraged to improve business processes.

https://docs.google.com/forms/d/1j1OI-1lr8EAsU-UDhEJqqWd3rC-Z1wTqUefYohi_Y/edit#response=ACYDBNjB7fPdOJGZAU_Z5HjsV2dEmBA... 1/3

Does your business use a business innovation strategy?

- ☐ Yes
- ☒ No

How would you describe your company's business innovation strategy?

Keeping up with the latest trends.

How would you rate your company's business innovation strategy based on the following classifications?

- ☐ Proactive
- ☐ Active
- ☒ Reactive
- ☐ Passive

Would you say there was a relationship between technological evolution and business innovation strategy?

- ☐ Yes
- ☒ No

10/28/2020

The impact of technological evolution on business innovation strategy.

To what extent has technology evolution impacted your current company's business innovation strategy? (0-Not at all; 1- To a small extent; 2-To some extent; 3-A moderate extent; 4-To a great extent; 5- To a very great extent)

	0	1	2	3	4	5	
Not at all	☐	☐	☐	☐	☒	☐	To a very great extent

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Google Forms

https://docs.google.com/forms/d/1j1OI-1r8EAsU-UDHEJqqhwWd3rC-Z1wTqUefYohi_Y/edit#response=ACYDBNjB7fPdOJGZAU_Z5HjsV2dEmBA... 3/3

8.5. Annexure E – Originality Report

Digital originality report available on VC Learn

Research Purpose/ Objective	Primary Research Question	Research Rationale	Seminal Authors/ Sources	Literature Review – Conceptual Framework	Paradigm	Approach	Data Collection Method(s)	Ethics	Anticipated Findings	References
To examine the extent to which technological evolution influences business innovation strategy.	To what extent does technological evolution influence business innovation strategy.	<i>This study is important as it will emphasise the importance of business innovation strategy as technological evolution advances.</i>	- Radovan, Richa - Christensen, Clayton	Theme 1: The importance of using strategic management and business innovation to keep up with technological evolution Theme 2: How managers can predict technological evolution by analyzing how it evolves Theme 3: The impact globalization has on technological evolution and why it encourages collaboration	Paradigm Positivism Epistemology <i>The only valid knowledge is knowledge produced via empirical observation</i> Ontology <i>Reality is external and objective and the laws that govern it can be discovered.</i>	Quantitative	<i>The researcher will utilise a survey using questionnaires incorporating all types of questions to collect the data needed.</i>	<i>The researcher will uphold a high code of ethics by only including information that is unbiased, accurate, and confidential.</i>	The relationship between technological evolution and business innovation is strong and businesses that acknowledge and act on this relationship benefit greatly from it.	- Sood, A. and Tellis, G. J. (2005) 'Technological Evolution and Radical Innovation', <i>Journal of Marketing</i> , 69(3), pp. 152–168. doi: 10.1509/jmkg.69.3.152.66361
						Population				
						Population Parameters Individuals that are in middle to top management of a business				
Research Problem	Secondary Questions/ Hypotheses/ Objectives	Key Concepts	Key Theories			Sampling	Data Analysis Method(s)	Limitations	Anticipated Contribution	
Businesses that don't technologically evolve and adapt remain stagnant in business innovation strategy and cannot competitively operate.	There is a positive relationship between technological evolution and business innovation strategy.	-Technology -Technological evolution -Evolution -Innovation -Innovation strategy	-Disruptive innovation theory - Technological evolution theory		Axiology Objective research, truth and reason are valued	Probability or non-probability Probability sampling method Sampling method Stratified sampling Size 20	Unit of Analysis <i>Businesses willing to participate</i> Data Analysis Method(s) <i>Descriptive statistics</i>	<i>Limitations could include the reliability of numerical data that was made public and used in the study and the limited amount of feedback that is expected. Covid-19 may also limit the studies reach.</i>	<i>This study will highlight the relationship of technological evolution and business innovation strategy by proving with clear and scientific information the connection between the two.</i>	- Vaesen, K. and Houkes, W. (2017) 'Complexity and technological evolution: What everybody knows?', <i>Biology & Philosophy</i> , 32(6), pp. 1245–1268. doi: 10.1007/s10539-017-9603-1