DRIVERS OF ENTREPRENEURIAL ORIENTATION AND INNOVATION CAPABILITIES IN AFRICAN INTERNET STARTUPS

Ekenedilichukwu Gilbert Onwu

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(Business Management and Administration) in the
Faculty of Economic and Management Sciences
at Stellenbosch University

Supervisor: Prof Marius Ungerer

Co-supervisor: Prof Elsamari Botha

December 2021

Declaration: Plagiarism

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Ekenedilichukwu Gilbert Onwu

Date: December 2021

Abstract

Tech startups worldwide begin their operations and strategic business initiatives with high expectations of success, but 90% of these startups collapse within their first year of operation. In most developing countries, that number is closer to 95%. This painful reality globally, which is more pronounced in developing markets, is reportedly said to be due to the lack of understanding of what capabilities to foster and the degrees to which each one should be focused on. In many developing countries of Africa, this knowledge gap has led to low levels of sustainable innovation and entrepreneurial activity, which pose a potential threat to employment creation and economic productivity. External capabilities, like infrastructural capabilities or macro-economic capabilities, are constantly changing and peculiar to different business environments making it very difficult for startups to control and develop in reality. However, startups who develop the appropriate internal capabilities, may better understand to what extent investments into certain capabilities may foster their internal business objectives. In addition, startups have often looked at capabilities in isolation as drivers of success. Consequently, such limited focus may not provide a comprehensive overview of the capabilities deemed necessary to drive success in an increasingly digitised business climate.

Consequently, a comprehensive overview of the capabilities deemed necessary to drive success is lacking.

This study therefore investigates which capabilities are necessary to foster innovation and entrepreneurship in tech startups, and how these capabilities directly influence startup performance. Using Teece's SST (sense, seize, transform) dynamic capabilities-based approach, a framework of all the capabilities needed to drive tech startup performance is presented. This approach was premised on the use of capabilities employees and entrepreneurs of tech startups identified in the literature as relevant, meaningful and thought-provoking for tech startups looking to drive success. Hence, the study's focus was on those identified and include as follows: *top-management capabilities, technological competence, organisational learning capabilities, innovation capabilities, entrepreneurial orientation and organisational performance.*

We investigate the proposed framework amongst tech startups in four African countries (Nigeria, Ghana, Kenya, and South Africa). A descriptive research design was used, where online surveys were used to target management staff using quota sampling. A sample of 254 individuals employed in tech startups across the four countries was surveyed. Structural equation modelling, in particular PLS-SEM, was used to test the proposed model. The results were confirmed with covariance-based SEM.

This study therefore contributes to existing tech startup literature in four ways. First, it provides a comprehensive view of the dynamic capabilities that tech startups need in order to increase their likelihood of success, something isolated approaches have struggled with in the past. Second, this study directly links these capabilities to organisational performance and illustrate how the key mediators of innovation capabilities and entrepreneurial orientation contributes to organisational performance. Third, the findings also help better understand the combined mediating effects of innovation capabilities and entrepreneurial orientation - previously often studied separately – on fostering firm performance. Finally, we test this model in an emerging market context where there is a paucity of research and insight into the factors that contribute to startup success.

The study's significance is that what initially began as a complex range of isolated drivers that were implicitly linked but in an unspecified way to a firm’s performance has been simplified into a concise, comprehensive capabilities-based SST model. The model's application suggests that it is likely to give startups and their founders better performance indicators that have the potential to influence their culture, mindset, behaviours, and ability to succeed, where so many seem to have failed before.

Acknowledgements

I would like to firstly thank God my loving Father, Mother Mary, the angels and saints for providing me with the grace, tenacity and resolve I needed to complete this PhD.

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"It is not that I'm so smart. But I stay with the questions much longer"

- Albert Einstein.

"Thinking is the hardest work there is, which is probably the reason, so few engage in it"

- Henry Ford.

Dedication

To my wife, my parents, siblings, and friends

"Set your hearts on his kingdom first, and on God's saving justice, and all these other things will be given you as well. So do not worry about tomorrow: tomorrow will take care of itself. Each day has enough trouble of its own."

- Matthew 6: 33-34.

Declaration: Editing of Dissertation

27 April 2021

To Whom It May Concern

Language Editing

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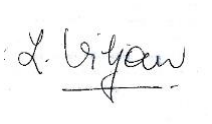

Leonie Viljoen, PhD (UCT)

Language Practitioner

Cell: 082 9244 733

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I, Ronel Gallie, acknowledge that I did the technical formatting, checking of the reference list and cross-referencing of the dissertation of **Ekenedilichukwu Gilbert Onwu**. Feedback about the work has been provided to the candidate.

Ronèl Gallie

Technical Editor

Cell: 084 7780 292

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Acronyms and Abbreviations

AI	Artificial intelligence
AVE	Average variance extracted
CEO	Chief executive officer
CFA	Confirmatory factor analysis
EO	Entrepreneurial orientation
IC	Innovation capabilities
ICT	Information and communications technology
IoT	Internet of things
ITU	International Telecommunications Union
PLS-SEM	Partial least squares structural equation modelling
PhD	Doctor of Philosophy
RITA	Research on Entrepreneurship in Advanced Technologies
SEM	Structural equation modelling
SST	Sense Sieze Transform
USB	University of Stellenbosch Business School

Definitions of key terms

For a better understanding of this study, the terms below are defined for context in this research.

Tech/Internet startups - According to Investopedia (2021) the term *tech startup* is defined as a company in the first stages of operations whose purpose is to bring technology products or services to market. These companies deliver new technology products or services or deliver existing technology products or services in new ways. In this study the term *internet startup* or *tech startup (*as it is more populary known) is defined as a company in its early stages of development whose primary mode of delivering a product or service to the market is built on the back of technology and more specifically the internet.

Capabilities - The dictionary definition of the term *capabilities* is defined as "the ability to perform or achieve certain actions or outcomes." In this study the term *capabilities* is defined as the expression or the articulation of the capacity, materials and expertise an organisation needs in order to perform core functions.

Dynamic Capabilities - According to Teece (2018) the term *dynamic capabilities* is defined as a firm's ability to integrate, build and reconfigure internal and external competencies to address business needs in rapidly changing environments. In this study the term *dynamic capabilities* is defined as such.

External Dynamic Capabilities - According to Foster & Handy (2008) the term *external dynamic capabilities* is defined as those abilities to function that are conferred by direct connection or relationship with a person or entity outside the immediate organisation. In this study the term *external dynamic capabilities* is defined as the ability to integrate, build and reconfigure competencies - conferred by a direct relationship with a person or entity outside the organisation - to address business needs in rapidly changing environments.

Internal Dynamic Capabilities – According to Teece (2018) the term *internal dynamic capabilities* is defined as the inherent ability within an organisation to optimally and purposefully adapt and catapult the organisation's resource base. In this study

the term *internal dynamic capabilities* is defined as the ability to integrate, build and reconfigure inherent competencies within the organisation to address business needs in rapidly changing environments.

Comprehensive – The dictionary definition of the term *comprehensive* is defined as the "inclusion or dealing with of all or nearly all elements or aspects of something". In this study the term *comprehensive* is defined as such.

Entrepreneurial Orientation – According to Martin-Rojas, Fernández-Pérez & García-Sánchez (2016) the term *entrpeneurial orientation* is defined as a multidimensional concept, present at the firm level, which describes an organisation's entrepreneurial processes, practices, behaviours and decision-making styles that embraces at least three dimensions, namely: *risk taking, innovativeness and proactiveness*. In this study the term *entrpeneurial orientation* is defined as such.

Innovation Capabilities – According to Ganzer, Chais & Olea (2016) the term *innovation capabilities* is defined as a multidimensional concept that encapusulates a firm's ability to identify new ideas and transform them into new offerings that embraces at least four dimensions in execution namely product, process, marketing and organisation. In this study the term *innovation capabilities* is defined as such.

Top Management Capabilities – According to Martin-Rojas et al. (2016) the term *top management capabilities* is defined as the ability of top and senior managers within in a firm to construct, integrate, and reconfigure the organisation's resources and competences. In this study the term *top management capabilities* is defined as such.

Technological Competence – According to Singh, Bhowmick, Eesley & Sindhav (2019) the term *technological competence* is defined as the firm's ability to reconfigure, create and sustain the organisational resources using technology effectively that embraces at least three dimensions in execution namely *technological skill, technological will and technological knowledge*. In this study the term *technological competence* is defined as such.

Organisational Learning Capabilities – According to Romano & Zabala-Iturriagagoitia (2020) the term *organisational learning capabilities* is defined as the organisation's ability to gain and process new knowledge related to its function and using that knowledge to adapt to a changing environment and increase efficiency. In this study the term *organisational learning capabilities* is defined as such.

Organisational Performance – According to Putri, Nurwiyanta, Sungkono & Wahyuningsih (2019) the term *organisational performance* is defined as the actual output or results of an organisation as measured against its intended outputs, objectives and key metrics of success. In this study the term *organisational performance* is defined as such.

CHAPTER 1 :

INTRODUCTION AND RATIONALE OF THE STUDY

1.1 ORIENTATION TO THE CHAPTER

This chapter serves as an introduction to the study. It includes a background discussion on the declining performance of startups globally, including Africa. It highlights how the low performance results experienced by these startups in Africa have not been comprehensively explained by any singular factor known today. This is followed by a discussion on several different dynamic capabilities of startups globally versus startups in Africa that could possibly foster performance, while at the same shedding some light on the significance of tech startups in economic development literature as a way of ratifying the rationale of the study. A case for looking at internal dynamic capabilities as opposed to external capabilities (as defined above) towards developing a comprehensive dynamic capabilities-based model for performance is made and discussed. A review of the literature highlighted gaps in theoretical and practical knowledge and it became clear that a bank of knowledge to help tech startups focus on the correct mix of dynamic capabilities is lacking in the literature, especially in the African context. Those involved in building internal programs that can foster a successful entrepreneurial orientation (Ganzer et al., 2017), and a firm's capabilities for innovation lacked a comprehensive approach to making more informed, sustainable decisions in tech startups that respond directly to the needs of a dynamic emerging market environment (Martín-Rojas et al., 2013; Teece, 2018). As a result, the effects of traditionally isolated and comprehensive capabilities-based approaches to startup performance literature are discussed. Thereafter, the problem of the study and the consequent research question and objectives are presented. The chapter concludes by discussing the significance and delimitations of the study.

1.2 INTRODUCTION TO THE STUDY

In recent years, there has been a growing number of tech startups – new businesses developed, enabled and operationalised using technology at their core – commencing operations in highly competitive environments with high expectations of success as a result of this technological DNA alone (Martín-Rojas, Fernández-Pérez and García-Sánchez, 2013; Teece, 2018; Vaznyte & Andries, 2019). However, many of these businesses fail because they lack the necessary capabilities and know-how to effectively drive their performance (Martin-Rojas et al, 2013; Teece, 2018; Cagliano & Grijalvo, 2018; Vaznyte & Andries, 2019). This is even more so for tech startups in African countries (Singh et al., 2019).

The inadequacy of the necessary capabilities needed to foster performance in tech startups has been even more pronounced for countries on the African continent looking to foster economic growth. For example, in comparison with other western more developed business environments such as Europe and the Americas, the technological and infrastructural capabilities that startups need to enable their success has been lacking. This is made evident by the paucity of tech startups that can compete globally, burgeoning out of the African continent. For example, fewer than two percent of internationally recognised tech startups across the globe are from the African continent (Startup Ranking, 2020). In addition, of the 600 unicorn (companies valued at over $1 billion) tech startups in the world, the African continent has only produced two, with the US alone producing about 50% of those (Minaev, 2021). The lack of performance by startups in countries on the African continent in comparison to the startup performance of countries in more developed markets has been acknowledged and documented in several reports (Liquid Telecom, 2017; Partech Ventures, 2019). These reports highlight that internal dynamic capabilities of founders and employees as well as external capabilities pertaining to the likes of infrastructure and sector funding, are in short supply on the continent at the rate required for its continued growth and development (Partech Ventures, 2019).

The challenge of low infrastructural capabilities, a factor external to the firm, hampering entrepreneurial activity in developing markets is well documented but still cannot singlehandedly account for the reasons many startups fail and few succeed (Teece, 2018; Vaznyte & Andries, 2019). Five percent (5%) of startups on the African continent have been able to succeed in spite of these challenges, which begs the question: What other capabilities or combinations thereof do startups need to drive entrepreneurship and innovation and, in turn, performance?

The issue of funding, also known as investment capability – studied in Schumpeterian entrepreneurial and innovation literature as an external capability – has been lacking in Africa. Figure 1.1 below shows that the investments made in African tech startups have been largely negligible in comparison to investments made in tech startups in Western regions. Figure 1.3 not only further highlights this point but shows a decline in tech startup funding over the last 5 years, largely indicative of poor performance figures. However, low funding has also failed to singlehandedly explain the reasons why many tech startups fail and few succeed (Teece, 2018).

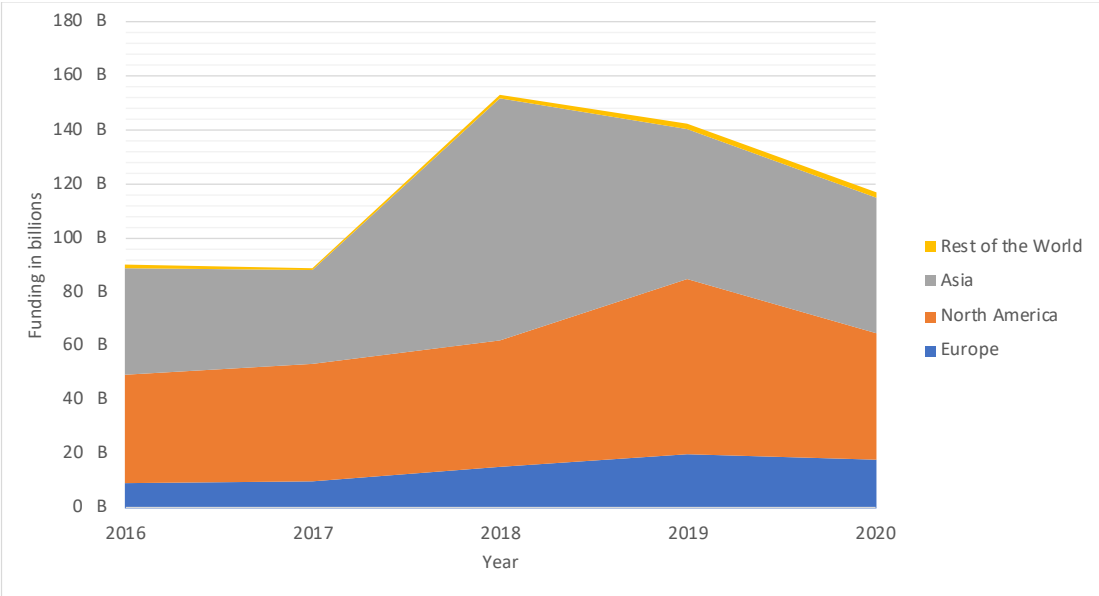


Figure 1.1: Tech startup funding globally by region over time (Crunchbase, 2020)

Reports by Crunchbase and Partech Ventures show that even the six percent (6%) global decline in startup funding and even larger 31% decline in funding experienced by startups on the continent in 2020 has been unable to comprehensively explain why seven percent (7%) of startups in 2020 were still able to succeed and out-perform their competitors in spite of this (Chrunchbase, 2020; Partech Ventures, 2019).

Researchers in more recent studies have therefore alluded to shifting focus in tech startup literature to capabilities and competencies more internal to the startup itself since problems consumers face that require solving tend to sometimes be the fire that fuels innovation and entrepreneurial activity internally (Martin-Rojas et al., 2015; Ganzer et al., 2017; Teece, 2018; Singh et al., 2019).

Therefore, this study deemed it necessary to investigate whether a comprehensive set of internal dynamic capabilities as opposed to an isolated individualistic view of capabilities could strengthen the impact, if any, of entrepreneurial orientation and innovation capabilities on firm performance. A key focus was on capabilities, closer, more internal to the startup as a way of providing further insights into what can be done to strongly reduce the number of startups that ultimately fail.

Few could have accurately predicted the massive social, economic, and technological consequences of the rise and proliferation of internet-driven businesses across Africa, especially in Africa (Liquid Telecom, 2017). The embedded intelligence and connectivity that the explosion of the internet allows has enabled businesses on this continent to scale quickly and harness large volumes of data and information instantaneously, skills largely needed by a workforce of the 21st century. This is something

a vast number of businesses across Africa were unable to achieve a few years ago (WeeTracker, 2018). The permeation of the internet on the African continent in recent years has helped drive efficiencies in many sectors; helped tech startups reinvent their business models; and helped startups improve their overall customer and end-user experience, even though not nearly as advanced as those in more developed markets (Paradkar et al., 2015; Liquid Telecom, 2017). As a creator of a highly skilled workforce and a catalyst for wealth creation, tech startups have become increasingly indispensable to African economies (Singh et al., 2019). Unfortunately, a lack of knowledge and understanding of how exactly to achieve growth and scale have left startups lost and confused in their pursuit of success. The next section reviews the performance of African tech startups in business.

1.2.1 The performance of tech startups in Africa

A review of the literature shows that the performance of tech startups across multiple sectors and industries on the African continent has been dismal (Vaznyte & Andries, 2019), especially in comparison to tech startups in more developed markets. As an example, the assessment of the performance of tech startups across multiple industries – as measured by their ability to exit through a sale or an acquisition by a larger more established company –has indicated that an almost negligible amount of African tech startups were able to achieve this, as is shown in Figure 1.2 below.

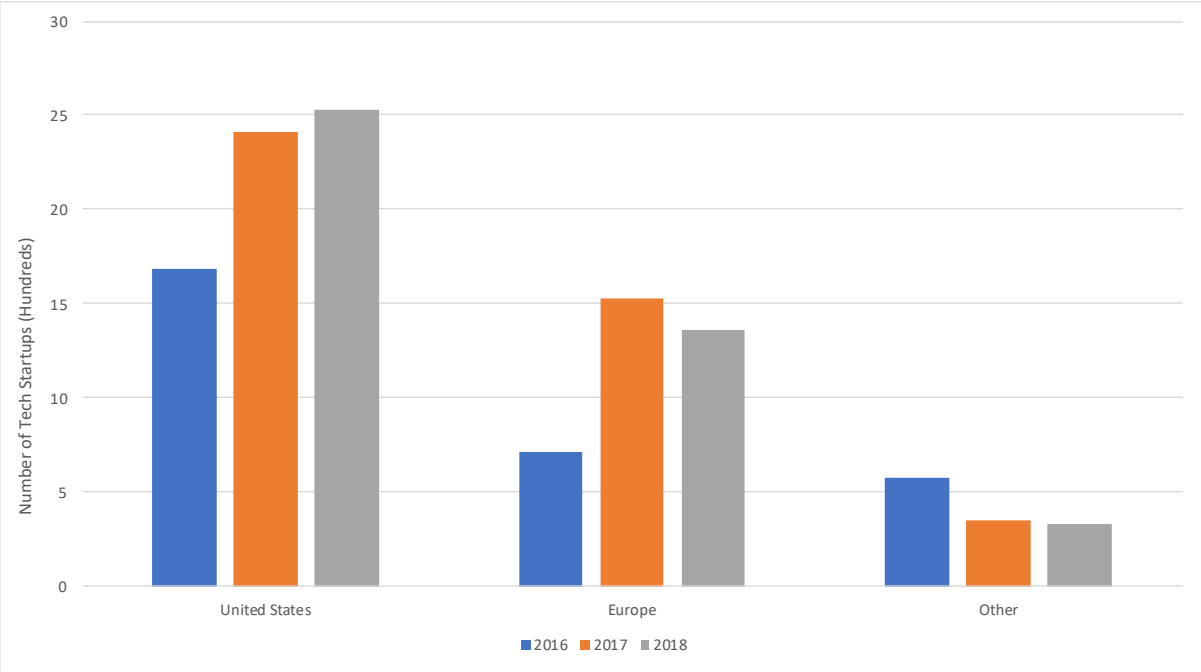


Figure 1.2: Tech startup exits globally by region over time (Crunchbase, 2020)

Another measure of the performance of startups in countries is the ability of startups based in these countries to raise funding for those businesses, since investors, as a rule, prefer to place financial

investments in countries where favourable returns over a period of time are seen as a serious possibility (Teece, 2018; Singh et al., 2019). The latest figures available in Figure 1.2 above indicate the dramatic decline from 2016 to 2018 in the performance of these startups in regions outside the United States and Europe, corroborated by the decline in startup funding made available for African tech startups as shown in Figure 1.3 below. It is apparent that data relating to tech startup performance is largely skewed to studies conducted in the very developed market conditions, so the profits gained from investing in key capabilities and what those precise capabilities are in developing markets like those on the African continent are just not available (Acosta, Crespo & Agudo, 2018; Teece, 2018).

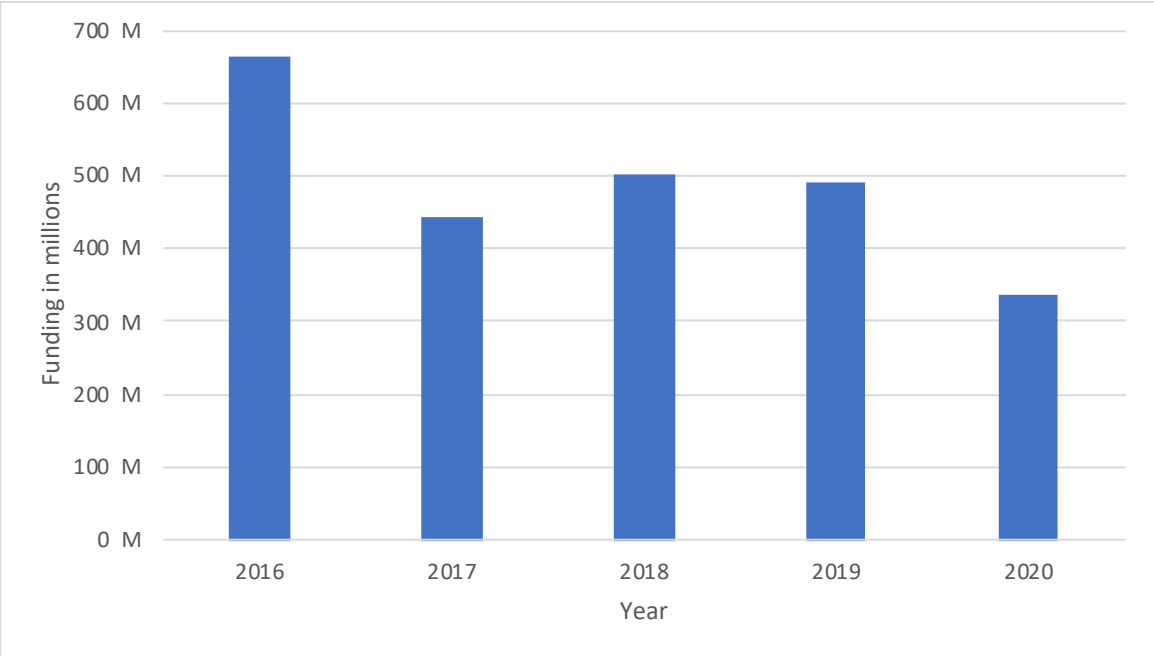


Figure 1.3: African tech startup funding over time (Crunchbase, 2020)

Ensuring the success of tech startups on the African continent has become increasingly important in helping nations combat prevalent socio-economic challenges such as high rates of unemployment, food and healthcare insecurity, environmental sustainability, financial exclusion, and infrastructural deficiencies. This has motivated several countries on the African continent to take a more proactive approach to boosting entrepreneurial intent as a way to potentially improve the poor performance of startups. Kenya, for example, has seen a proliferation of tech startups tackling major socio-economic challenges through innovative use of technology in both the public and private sectors across the country. South Africa has seen, over the last five years, a stupendous increase in tech startups disrupting financial and healthcare technology markets with the aim of creating market-relevant, customer-centric solutions and services (Liquid Telecom, 2017; Quartz Africa, 2018; Pedroncelli, 2018).

Just under 30 deals saw African tech startups raise just over a $1 million each in 2018, a negligible number globally but an encouraging amount nonetheless (WeeTracker, 2018; Quartz Africa, 2018). The largest of these rounds of funding was raised by a Kenyan financial technology startup called Cellulant, a digital payments platform that garnered $48 million in May of 2018 in their third round of investment funding, assisted by impact investment fund by private equity firm TPG Growth (WeeTracker, 2018; Quartz Africa, 2018). Branch, another Kenyan online micro-lending financial technology startup, raised the second highest amount of investment amounting to $20 million (WeeTracker, 2018; Quartz Africa, 2018). A Nigerian technology business loan startup, Lidya, an agriculture-technology startup, WeFarm, and a remittance startup, SureRemit, raised over $1 million in funding in 2018.

Kenya, Nigeria, Ghana, and South Africa all received multimillion-dollar rounds of investments from global private equity firms in 2018 (Forbes, 2018; Quartz Africa, 2018). No other country had raised more startup funding than South Africa, Nigeria, Kenya, and Ghana, which served as the basis for the selection of these countries for research in this study (Forbes, 2018; WeeTracker, 2018). A research report released by Partech Ventures indicated that $560 million in venture capital funding was invested in over 80 African startups in 2017, a growth of about 53% from the $367 million reported in 2016 (Partech Ventures, 2019). In comparison, in the US alone the amount of funds invested into tech startups grew more than 400% to almost $85 billion dollars in 2018, with investment deals in over 8700 businesses, once again highlighting the mediocre performance of tech startups on the African continent.

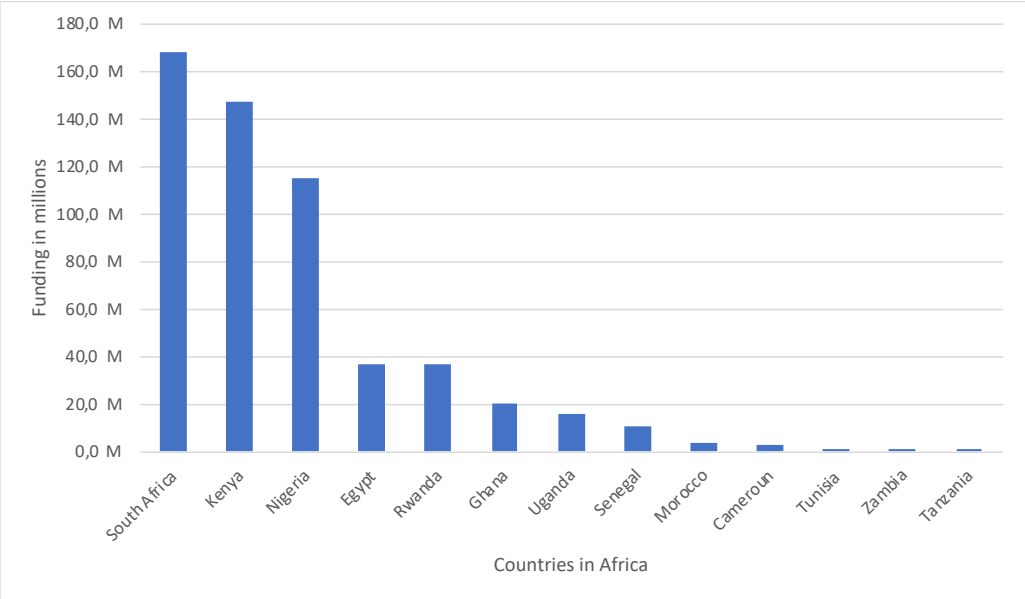


Figure 1.4: African funding per country (Partech Ventures, 2019)

Figure 1.4 above shows an expanded view of countries in Africa whose startups have received funding from investors globally. Four of the countries of focus in this study appear in the top six. These encouraging figures in these key countries have placed significant pressures on policy makers and business leaders to figure out the exact drivers considered to be required to favourably position these firms in startup performance comparable to firms in more developed markets (Martín-Rojas et al., 2013; Medcof, 2017; Teece, 2018;).

The overall reduced influx of funds to internet-based startups on the continent has perplexed both academics and practitioners. Developing nations like Nigeria, Ghana, Kenya, and South Africa are gravitating towards market-based policies to boost economic prowess and eradicate poverty. Consequently, most sectors within these economies are seeing the need to undergo swift organisational changes, including allowing foreign investors the freedom to participate in their economies to reduce rampant environmental risk and unstable development (Boso et al., 2013; Helfast & Raubitschek, 2018). These dynamics have undoubtedly had an influence on the managerial suppositions and the administrative procedures of a large number of startups that are serially entrepreneurial in nature, including but not limited to methods employed to exploit new opportunities and how startup performance is achieved as a result (Chironga, Leke, Lund, & Van Wamelen, 2011; Goedhuys, & Sleuwaegen, 2010; Helfast & Raubitschek, 2018).

However, due to the complex nature of the business environment in developing regions like those on the African continent, it is still largely unclear whether investing in key technological variables is suitable for all startups, in all industries, all the time (Webb et al., 2011; Boso et al., 2013). More importantly, the returns gained from leveraging the complementarity between technology drivers, and entrepreneurial and innovation-oriented undertakings lacks empirical research (Morgan, Katsikeas & Vorhies, 2012; Boso et al., 2013; Acosta et al., 2018). The institutional frameworks within which these happenings thrive also lack thorough comprehension by scholars in the field (Cadogan, 2012; Acosta et al., 2018). Therefore, a comprehensive capabilities-based approach has become intrinsically relevant in these markets and the ability to determine a comprehensive set of drivers to foster startup performance has become equally important in such economies, a knowledge gap this study sought to fill.

There is a clear need to research, understand and suggest a framework and delineate the boundary conditions where a startup's capabilities can help it flourish; that is, to discover which of these organisational drivers are the least and most effective in strengthening the impact of entrepreneurship and innovation on startup performance in complex developing business environments.

The study also aimed to help future researchers understand the extent to which the effectiveness of these drivers is a result of varying human capital, social and business network conditions prevalent in the different African startups researched in this study.

1.2.2 Tech startups and their significance

Internet startups, more popularly known as tech startups, are the drivers of economic development and productivity improvements and are the catalysts for new industry creation and novel products and services (Martín-Rojas et al., 2013; Grinstein & Goldman, 2006). As opposed to industrial startups – ones whose operations are not predominantly enabled by high technology and the internet – tech startups have a unique ability to rapidly change the economic outlook of a nation, largely because of the network effect or shared economic nature of the internet that powers the scale and growth of these startups (Fernandes et al., 2006; Benham et al., 2018). Where traditional new businesses require more time and investment to reach global market rapidly, tech startups have the unique ability to blossom out of nowhere and make considerable impact not just locally but internationally as well (Teece, 2018; Singh et al., 2019). Understanding what drives their success as a result becomes increasingly important to governments looking to create employment and compete on the global economic stage.

For tech startups to create internal programs that boost the capabilities of individuals in key departments within the firm has become not only true but essential (Solow, 1974; Lochner, 2011; Bolivar Ramos et al., 2012; Boso et al., 2013; Martín-Rojas et al., 2013). Some capabilities, albeit individually, have been seen to have a positive effect on the ability of firms to exploit novel opportunities effectively (Insead, WIPO & Cornell University, 2015; Linton & Kask, 2017). Another factor that some scholars have deemed effective in economies developing because of driving and developing the growth of high technology startups, is the nation's capacity to find ways to improve their ability to attract direct foreign investments into its core developmental sectors (Newbert et al., 2007; Walsh & Linton, 2002; Martín-Rojas et al., 2013; Teece, 2018).

Tech startups in Africa are no different, in that they also need the creative nature of tech startups to boost the economic output but are largely different in the nature of the impact a failed startup performance strategy in Africa can have on its citizens and their general livelihood (Gachanja et al., 2020). The consequences are profoundly more dire (Singh et al., 2019; Gachanja et al. (2020). The development of tech startups in Africa could radically change the state of the healthcare, food, unemployment, and education crisis experienced by many nations on the African continent (Liquid Telecom, 2017; Gachanja et al., 2020).

A study that investigated the effect of technological capabilities on learning suggested that tech startups with the capacity to strengthen their internal factors were also able to intensify the participation of the most active entrepreneurial minds in firm (Tomczyk et al., 2013). This was because of the rapid nature of some of these tech startups to scale to new markets almost overnight. This implies that a nation's ability to help develop tech startup performance will have a direct positive impact on encouraging the most entrepreneurial minds in the state to participate more in the economy and consequently create more jobs.

In highly competitive technological settings that are characterised by constant transformation and the increased significance of not only the timing in innovation but the fostering of capabilities that allow innovation to flourish, acquiring capabilities have become crucial requirements for the survival of tech startups today (Berchicci, 2013; Hussinger, 2010; Martín-Rojas et al., 2013; Boso et al., 2013; Teece, 2018).

Therefore, this study's ability to shed some light on what drives tech startup performance in a way that provides value to tech startups in real life will prove critical in the development of tech startup performance literature. Tech startup performance development, as suggested by a number of scholars has been linked to improved competitiveness and economic growth in both developed and developing markets (Boso et al., 2013; Linton & Kask, 2017).

1.2.3 Capabilities and performance in entrepreneurial literature

Various studies (Martín-Rojas et al., 2013; Medcof, 2017; Teece, 2018; Cagliano & Grijalvo, 2018; and Vaznyte & Andries, 2019) suggest that how well tech startups perform may be determined by a set of employee and management capabilities – some internal and others external – that include but are not limited to management, infrastructural, technological, investment, learning, and marketing capabilities, among other factors. In recent times, the ability for tech startups to determine what variables to foster to improve their ability to perform can be described as a crisis of relevance and a crisis of oversimplification – individual capabilities put forward by scholars failing to be relevant and thorough in the quest for sustained improved performance of tech startups. Some scholars have argued that a radical change in mindset or startup orientation with a focus on an attitude towards risk and a desire to constantly innovate and find new ways of doing old things could be a major determinant of startup performance (Tuluce & Yurtkur, 2015; Medcof, 2017; Monteiro et al., 2019). They argue that the individual impacts of entrepreneurial orientation on performance and the impact of innovation capabilities and performance are clear. Others, however, argue that a mindset shift in and of itself is not enough to explain high-tech startup failure rates since that phenomenon is usually already present in most tech startup firms when compared to individuals working in more established

firms (Martín-Rojas et al., 2013; Teece, 2018; Singh et al., 2019). They then argue that tech startups by nature alone must embrace an entrepreneurial mindset and must do some kind of innovation to remain relevant (Singh et al., 2019).

Consequently, a comprehensive set of capabilities that contribute towards startup performance is perceived by many as unclear and ambiguous (Teece, 2018; Acosta et al., 2018) but is acknowledged as dire to decipher in entrepreneurial literature (Singh et al., 2019).

Several reports and studies describe the determining of factors that drive the capabilities of startup firms in very risky technology driven industries as particularly complex to decipher and somewhat incongruent with the needs of tech startup firms in practice (Teece, 2018; Acosta et al., 2018). In Africa, for example, tech startups not only perceive factors driving performance as particularly difficult to ascertain but a large number of startups argue that a lack of capital or the availability of funding is the single and only reason startups fail on the continent, and all other capabilities suggested are sometimes divorced from the realities on the ground (Cadogan, 2012; Boso et al., 2013; Acosta et al., 2018; Gachanja, Nga'nga & Kiganane, 2020). For instance, Gachanja et al. (2020) in a recent study looking at organisational learning as a driver of performance, found that tech startups in Africa in comparison to tech startups in more developed countries were less likely to take the time out to foster a culture of learning or a desire to acquire new external knowledge, as very few firms on the continent had the time, technological infrastructure, or wherewithal to foster this capability. This makes the need to foster only learning capabilities as a driver of performance not only inconclusive but also irrelevant in some African contexts.

In summary, various researchers have pointed out some of the shortcomings of the conventional individualistic approach to figuring out what startups need to foster in order to drive performance:

- They do not provide tech startups with the opportunity to comprehend the link between understanding what drives performance in theory and how it applies practically to their day-to-day experiences.
- They make the quest for knowledge about what drives their ability to perform irrelevant and oversimplistic in the eyes of entrepreneurs and innovators.
- They lead to gaps between what startups comprehensively really need and what policy makers think they need.
- They lead to isolated suggestions of what startups supposedly need and do not foster a sense of confidence in academic literature being able to provide answers that solve real problems for tech startups.

The inability of the individualistic traditional capabilities-based approaches to foster startup performance in technology driven industries could therefore at least partly account for the perceptions of irrelevance, oversimplification and complexity prevalent in tech startup circles today, and consequently, the alarmingly high failure rates of tech startups across the world (Martin-Rojas et al., 2013; Martin-Rojas et al., 2015; Teece, 2018; Acosta et al., 2018). Tech startups of the future may face challenges in sustaining relevance and in maintaining competitive advantage, should they not find ways to boost factors that drive their innovation processes (Grinstein & Goldman, 2006; Ganzer et al., 2017; Berchicci, 2013; Martín-Rojas et al., 2013; Teece, 2018). Even in developed markets, it is reported that over 90% of founders and entrepreneurs who were unsatisfied with how their startups were implementing their innovation strategies had no clue what the issue was (McGrath, 2016; Teece, 2018).

The question as a result arises: Would a more comprehensive capabilities-based approach that emphasises a combination of management, technological and organisational learning capabilities enhance the impact of entrepreneurial orientation and innovation capabilities on improved performance? Several studies in entrepreneurial literature have shown that entrepreneurs like to be able to relate to startup principles that they can use in the everyday running of their tech startups (Boso, Story, & Cadogan, 2013; Chang, Bai, & Li, 2015; Singh et al., 2019). Connecting key drivers to startup performance in practice entails the notion of a comprehensive capabilities-based approach (Martin-Rojas et al., 2013; Martin-Rojas et al., 2015; Ganzer et al., 2017), which is discussed below.

1.2.4 Internal dynamic capabilities-based approaches to drive tech startup performance

A discernible trend in startup performance development in entrepreneurial literature in the past few decades has been the use of capabilities-based approaches to improve startup performance in startup literature. In these approaches, drivers of performance are imbedded in authentic and unique capabilities either inherent to that startup or capabilities derived from external contexts that show the importance of startup concepts, principles and methods that can be applied in real life (Martin-Rojas et al., 2015; Ganzer et al., 2017).

The term ‘dynamic capabilities’ has a number of interpretations but is loosely defined as a firm's ability to integrate, build and reconfigure internal and external competencies to address business needs in rapidly changing environments. In entrepreneurial literature, these interpretations may include infrastructure, management, environmental, societal, investment capabilities, learning capabilities, marketing capabilities, personal and economic capabilities that could be used in driving and developing startup performance (Bitondo & Frohman, 1981; Dyrenfurth, 1990; Layton, 1994; Marino, 1996; López Sáez, Martín de Castro, Garcia Muina, & Navas López, 2005; Real, Leal, & Roldan, 2006;

Newbert et al., 2007; Danneels, 2008; Martín Rojas, García Morales, & Mihi Ramírez, 2011a, 2011b; Teece, 2018; Gachanja et al., 2020).

Previously, traditional dynamic capabilities-based approaches in tech startup literature have almost consistently been developed looking at either external dynamic capabilities or internal dynamic capabilities of the tech startup in isolation (Teece, 2018; Gachanja et al., 2020). Drivers of performance have almost always consistently individually looked largely at the perceptions of governments and policymakers (external) or the perceptions of new small business owners alone (internal), assuming that tech startups would be more interested in the same capabilities that appeal solely to the government, policymakers, and new small business owners. What we know from a review of the literature, however, is that not only are there inconsistencies in the performance results of tech startups who develop either their internal or external dynamic capabilities in isolation, but we also know that new small businesses and tech startups are not nearly the same (Teece, 2018). Schumpeter's theory of entrepreneurship and innovation – a capabilities-based approach in entrepreneurial literature that individually recognises entrepreneurial and innovation capabilities as precursors of performance – originally began in this vain but has since been unable to account for the low performance rates of startups across the globe (Monteiro et al., 2019).

As a result, this study puts forward a comprehensive model that suggests a more focused view on dynamic capabilities more internal to the firm and less external. The focus of the study is more on the introduction of technological, management and organisational capabilities more internal to the tech startup and less on environmental and societal capabilities that are more external. The rise and proliferation of technology, infrastructure development and more open global economies across the globe have made external dynamic capabilities less and less relevant in determining tech startup performance, as is evident by poor performance rates of startups even in developed markets where economic and political climates are more advanced (Martin-Rojas et al., 2015; Gachanja et al., 2020). In Schumpeterian theory, what precise combination of internal dynamic capabilities strengthen the impact of entrepreneurship and innovation on performance is unknown. It would therefore seem essential to involve not just founders of tech startups but the internal dynamic capabilities of the entire startup organisation in determining what combination of capabilities more internal and unique to the startups have an impact of the success and failure rates of said startups.

In this study, therefore, it was particularly important to involve the entire startup organisation in determining a comprehensive capabilities-based approach to developing startup performance.

Capabilities-based approaches in this study refer to know-hows that attempt to develop and drive startup performance from familiar internal contexts, such as management capabilities, technological capabilities, and the likes, which are closely linked to how startups perform in real life.

The table below gives a summary of previous literature that has looked at some of these constructs and their key findings and areas of focus to demonstrate a clear gap in the literature.

Table 1.1: Summary of existing literature

Study/Article	Context	Method	Key Findings and Areas of Focus			
			Drivers	Entrepreneurial Orientation	Innovation Capabilities	Linked to Performance
Martín-Rojas et al., 2013	European Tech Firms	Survey	High levels of technology know-how lead to increased firm performance.			Yes
Martens et al., 2018	Brazil	Survey		High levels of entrepreneurial orientation lead to business success		Yes
Ganzer et al., 2017	Brazil	Survey			High levels of innovation capabilities lead to increased organisational progress	No
Grillitsch & Nilsson, 2013	Sweden	Survey	High levels of technological competencies lead to increased firm performance.			Yes
Benham et al., 2018					High levels of innovation capabilities lead to increased sustainable development	No
Teece, 2018	United States of America	Survey and CEO interviews			High levels of innovation capabilities lead to increased profits.	Yes
Monteiro et al., 2019	Norway	Survey		High levels of entrepreneurial orientation lead to increased export performance		Yes
Vaznyte & Andries, 2019	Germany	Survey		High levels of entrepreneurial orientation lead to increased external financing for startups		No

Study/Article	Context	Method	Key Findings and Areas of Focus			
			Drivers	Entrepreneurial Orientation	Innovation Capabilities	Linked to Performance
Ince, Imamoglu, & Turkcan, 2016	Turkey	Survey			High levels of innovation capabilities lead to increased absorptive capacity of startups and consequently improved innovativeness.	No
Singh et al., 2019	India	Survey	High levels of grassroots innovation lead to entrepreneurial success but high levels of entrepreneurial orientation had very little effect on mediating the relationship.			Yes
Deligianni et al., 2019	Greece	Survey	Higher level of technological competence is associated with decreasing efficiency in orchestrating technological and non-technological resources and leveraging capabilities for innovation			No
Autio, 2015	Finland	Survey	High levels of technological competencies lead to success in schools			No
Linton & Kask, 2017	USA	Survey		Higher levels entrepreneurial orientation of have led to improved strategy development		No
Babatunde, 2020	Nigeria	Survey	Higher levels of developed internal learning capabilities lead			Yes

Study/Article	Context	Method	Key Findings and Areas of Focus			
			Drivers	Entrepreneurial Orientation	Innovation Capabilities	Linked to Performance
			to improved business success.			
Ayough et al., 2020	India		Higher levels of technological competencies lead to higher information capabilities and increased levels of internet entrepreneurship.			No
Gachanja et al., 2020	Kenya		Higher levels of learning lead to increased manufacturing output in more developed nations; more so than in developing ones.			No

The table demonstrates a clear gap in the literature concerning the extent to which a comprehensive set of drivers may strengthen the impact of a startup's entrepreneurial orientation and innovation capabilities on its ability to perform, both of which have been previously individually linked to project success, increased profits, and increased levels of access to finance. Research evidence suggests that a view to identify a set of comprehensive capabilities to foster other variables known to drive startup development, albeit disparately, may yield more positive results for tech startups looking to improve their chances of success.

1.3 PROBLEM STATEMENT

African tech startups have been characterised by poor performance across all sectors for several years (section 1.2.1 and figures 1.1 and 1.2). Remaining competitive in the midst of ever-changing technological landscapes and disruptive activity is perhaps the greatest complexity which startups face around the world and even more so in Africa, where the lack of infrastructural development is crippling (Ganzer at al., 2017). The ability to identify key internal and external dynamic capabilities to combat this complexity accentuated by poor tech startup performance has been identified by many researchers as crucial (Boso, Story, & Cadogan, 2013; Chang, Bai, & Li, 2015; Singh et al., 2019).

A comprehensive set of capabilities that contribute towards startup performance is perceived by many as unclear and ambiguous (Teece, 2018; Acosta et al., 2018) but is acknowledged as difficult to decipher in entrepreneurial literature (Singh et al., 2019). More recently the importance of fostering dynamic capabilities more internal to the firm as drivers of startup performance has been highlighted, but what combination of capabilities these should be is still lacking (Babatunde et al., 2016; Gachanja et al., 2020). This could result in the perception that present factors that truly influence whether tech startups fail or succeed are irrelevant, oversimplistic and complex (Boso et al., 2013; Berchicci, 2013; Chang, Bai, & Li, 2015; Martin-Rojas et al., 2015; Teece, 2018; Singh et al., 2019). Research findings (Ganzer et al., 2017; Teece, 2018) show that startups and their founders appreciate a comprehensive view of explicit links between tech startup capabilities they need to foster and the performance of their firms in real life.

The selection of variables to investigate in this study stemmed from a thorough literature review of dynamic capabilities-based approaches to startup performance which realised that if Teece's (2018) Sense, Seize and Transform (SST) theory of dynamic capabilities was to have validity, it needed to be studied as a comprehensive fact and not be solely focused on capabilities in isolation (Teece, 2018). In other words, as Monteiro et al. (2019) highlighted, not only on the role of the entrepreneur as Schumpeter's theory has, but also on the structure of and changes in technology, management, industry, organisational processes, markets, societies, economies, and political systems in which they

operate (Wiklund & Shepherd, 2003; Tuluce & Yurtkur, 2015; Monteiro et al., 2019). Schumpeter recommended further research to empirically investigate the idea that entrepreneurial and innovative mindsets made little sense without empirical attention placed on what fosters them internally when all other factors externally are held constant (Martín-Rojas et al., 2013; Tuluce & Yurtkur, 2015; Monteiro et al., 2019). This is a view Teece (2018) highlighted and a gap in knowledge this study sought to address.

Schumpeter's theory of entrepreneurship and theory of innovation – which scholars argue are subsets of Teece's SST dynamic capabilities-based theory (Monteiro et al., 2019; Babatunde et al., 2020) – acknowledge that tech startups rely on a plethora of variables to foster successful entrepreneurship and innovation and imply that these must work in cohesion for their firms to be successful (Monteiro et al., 2019). What these are and the degrees to which each one should be focused on in a highly complex infrastructural landscape is unfortunately unclear. However, research in other developing markets have alluded to the idea that a suite of capabilities can have a positive effect on organisational success in a high-tech environment (Babatunde et al., 2020). However, unfortunately for these startups, scholarly knowledge on the right mix of capabilities that can foster variables that have been known to improve a startup's chance of survival is just not available, a clear gap in Teece's SST dynamic capabilities theory.

When looking at which constructs would form a part of a more comprehensive framework for tech startup performance, key literature suggests the following. Two of the most argued capabilities considered crucial for startups looking to gain a competitive advantage are the *entrepreneurial orientation* and *innovation capabilities* of tech startups (Ganzer et al., 2017; Singh et al., 2019). However, though both the entrepreneurial orientation and innovation capabilities of a tech startup have been individually linked to performance, their impact has been unable to fully account for the poor performance figures of startups worldwide (Vaznyte & Andries, 2019). This could result in the perception that existing drivers of tech startup performance are simply ambiguous at best and simply not enough at worst. This suggests that a view of identifying a comprehensive set of dynamic capabilities that can strengthen the impact of both the entrepreneurial orientation and innovation capabilities on tech startup performance may yield more useful answers for tech startups in the real world. This evidence has necessitated an inquiry into the efficacy of a comprehensive capabilities-based approach to enhancing tech startup performance. Also, Babatunde et al. (2020) and Ayough et al. (2020) raised concerns more recently in discrepancies in performance results between organisational learning capabilities of tech startups in *developing markets* and organisational learning capabilities of tech startups in more developed markets. It therefore became necessary to better

understand the effect of the above-mentioned construct as part of a comprehensive model for tech startup performance development in the developing market context.

Capabilities-based performance approaches have been used extensively in entrepreneurial research in many countries for startup development and improved performance in startup literature (Clark & Ramachandran, 2018; Teece, 2018). In the key African countries of focus in this study, the goals and objectives of the South African National System of Innovation (SANSI), the Science, Technology and Innovation System of Ghana (STISG), the Science, Technology and Innovation System of Kenya (STISG), and the Nigerian National Innovation System (NNIS) for new businesses, especially high-tech startups, promote capabilities-based development strategies (Ghana MEST, 2009; Kenya MEST, 2009; Nigeria MEST 2009; South Africa MEST, 2008). However, research shows that a comprehensive capabilities-based approach to tech startup performance development has not been fully adopted by tech startups and startup founders in the region (Clark & Ramachandran, 2018; Gachanja et al., 2020). Babatunde, Perera and Zhou (2016) point out that tech startup performance in Africa is hardly influenced by any kind of complete approach to capabilities development. This assertion is reiterated by Ayough, Alemtabriz and Tavanaei (2020), who found that specific outcomes of the national science, technology and innovation systems of developing nations that deal with the interface of high-tech startups and society were largely absent from entrepreneurial literature available to local tech startup incubators and accelerators meant to support new businesses.

The literature suggests that some dynamic capabilities-based approaches may have a positive influence on tech *startup performance* (Martin-Rojas et al., 2015; Teece, 2018; Singh et al., 2019). Tech startup performance is known to be influenced by a number of isolated internal and external variables, including management capabilities, infrastructural capabilities, technological capabilities, investment capabilities, learning capabilities, and marketing capabilities, among other factors (Boso et al., 2013; Berchicci, 2013; Chang, Bai, & Li, 2015; Martin-Rojas et al., 2015; Teece, 2018; Singh et al., 2019), with a focus in recent years on capabilities more internal to the firm, as discussed in section 1.2.3 above (Martin-Rojas et al., 2015; Gachanja et al., 2020). However, the combined effect and the strength of the impact, if any, of each dynamic capability have not been unequivocally established. Some studies (Teece, 2018; Ayough et al., 2020) found that only external dynamic capabilities-based approaches enhanced tech startup understanding of performance, others found no significant differences in tech startup performance when both internal and external capabilities were fostered by tech startups (Babatunde et al, 2016; Vaznyte & Andries, 2019), while others (Singh et al., 2019; Ganzer et al., 2017) found significant differences in tech startup development when internal capabilities were developed as opposed to external capabilities. The latter argued that external dynamic capabilities are ever

evolving in high-tech spaces and are difficult for tech startups to control. They argued that what is within their control is developing dynamic capabilities more internal to the firm, capabilities that are unique and can differentiate these startups.

In addition, evidence suggests that a capabilities-based approach to the development of tech startup performance literature should emphasise, among other things, *top management's capability*, *technological competence* and *learning ability,* according to various researchers who looked at some of these drivers individually (Martens et al., 2018; Monteiro et al., 2019; Ince, Imamoglu, & Turkcan, 2016). Scholars and tech founders argue that these dynamic capabilities need to be measurable, relevant, and practical for tech startups and their founders looking to improve their performance outlook (Monteiro et al., 2019; Minaev, 2021). However, there appears to be a dearth in the literature about the effectiveness of a comprehensive capabilities-based approach in enhancing the acquisition of these capabilities as drivers of tech startup performance. As a result, this study sought to answer the following question: *What is the effectiveness of a comprehensive set of internal capabilities, namely top management capabilities, technological competence, organisational learning capabilities, entrepreneurial orientation and innovation capabilities on enhancing tech startup performance?*

Traditional ways of understanding drivers of tech startup performance have often led to isolated and incomplete views, where many internal and external dynamic capabilities had no significant impact in providing answers to the greater question pf why many tech startups fail and few succeed (Martín-Rojas et al., 2013; Teece, 2018).

In the discussions above, the arguments contextualised the increasing importance of identifying a combination of dynamic capabilities that may strengthen tech startup performance. In addition, being able to identify and close knowledge gaps in literature, this study sought to investigate the key drivers that may strengthen the impact of both entrepreneurial orientation and innovation capabilities on tech startup performance.

To summarise the problem of the study:

1. Entrepreneurial orientation is necessary for tech startup success. In addition, entrepreneurship in general as a driver of poverty alleviation and socio-economic growth is widely acknowledged in policy and nationwide strategic declarations across Africa, quite specifically in the countries of focus in this study (Federal Republic of Nigeria, 2011; Republic of Kenya, 2008; RSA, 2008; Ghana Ministry of Environment, Science and Technology, 2009). Technology-based entrepreneurship, in particular, is positively associated with skilled job

creation, poverty alleviation and socio-economic development but exactly how to go about achieving this success is largely unknown (Ganzer et al., 2017; Berchicci, 2013; Hussinger, 2010).

2. Innovation as a serious catalyst of socio-economic development is widely acknowledged in policy and nationwide strategic declarations across the African continent (Federal Republic of Nigeria, 2011; Republic of Kenya, 2008; RSA, 2008; Ghana Ministry of Environment, Science and Technology, 2009). Developing the technological innovation capabilities of both the private and public sectors has been acknowledged by scholars to be strategically significant and a solution for solving societal difficulties, even though tech startups both globally and locally continue to fail at alarming rates (Martín-Rojas, 2013; Voudouris et al., 2012; Teece, 2018).
3. Though only a few startups have displayed sustained organisational performance and entrepreneurial success, a large number of these businesses, including those that failed, are still very uncertain and unclear about the drivers one needs to foster to remain competitive in today's challenging business environment (Ganzer et al., 2017; Teece, 2018). While hunting for innovation success, firms may discover their present attempts at fostering this phenomenon to be incongruous or out-dated (Martín-Rojas, 2013; Berchicci, 2013; Hussinger, 2010; Ganzer et al., 2017).
4. Tech startups looking to foster growth and productivity in a complex and challenging African business landscape require greater clarity on precisely what internal dynamic capabilities to foster and the degrees to which each one should be focused on. External capabilities are constantly changing and peculiar to different business environments, making it very difficult for startups to control and develop in reality. Therefore, startups with this critical knowledge of internal capabilities may better understand to what extent investments into certain capabilities may foster their internal business objectives (Miles & Covin, 2002; Ireland, Covin, & Kuratko, 2009; Voudouris et al., 2012; Martín-Rojas et al., 2013; Medcof, 2017).
5. When developing material for tech incubators, accelerators and startups, a lack of consistency in approach has led to a number of contradictions in performance result findings (Clark & Ramachandran, 2018; Gachanja et al., 2020). Some of these contradictions stem from approaches drawn up from the perspectives of policy makers alone or interviews with founders alone. Perspectives drawn up from *all* individuals working in tech startups is often overlooked. A comprehensive set of dynamic capabilities all individuals working in these startups consider appropriate, relevant and accessible may help startups better understand

what exactly to develop to improve their performance outlook (Ganzer et al., 2017; Teece, 2018).

It is against this backdrop that this study sought to develop a comprehensive set of internal dynamic capabilities related to tech startup performance, and more specifically how a comprehensive set of capabilities strengthened the impact, if any, of both innovation capabilities and entrepreneurial orientation on tech startup performance.

The relative effectiveness of this complete set of capabilities on strengthening the impact, if any, of both innovation capabilities and entrepreneurial orientation (linked separately in previous studies to firm performance) on tech startup performance was also measured and discussed. The interactive influence of both entrepreneurial orientation and innovation capabilities on performance was also measure and discussed. In addition, the interactive influence of a tech startup founders' education and employee startup experience, if any, was tested and briefly discussed.

1.4 RESEARCH QUESTION AND MODEL OF THE STUDY

Based on the above background and research problem, this study sought to answer the following research question:

> *What is the effectiveness of a comprehensive set of internal dynamic capabilities, namely top management capabilities, technological competence, organisational learning capabilities, entrepreneurial orientation, and innovation capabilities, on enhancing tech startup performance?*

To answer the above research question, the study put forward a model with the associated hypotheses stated as follows:

Ho1a: There is no significant influence of top management capabilities on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho1b: There is no significant influence of top management capabilities on the innovative capabilities of startups in the attainment of tech startup performance.

Ho2a: There is no significant influence of technological competence on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho2b: There is no significant influence of technological competence on the innovative capabilities of startups in the attainment of tech startup performance.

Ho3a: There is no significant influence of organisational learning on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho3b: There is no significant influence of organisational learning on the innovative capabilities of startups in the attainment of tech startup performance.

Ho4a: There is no significant influence of entrepreneurial orientation on the performance of tech startups.

Ho4b: There is no significant influence of innovative capabilities on the performance of tech startups.

Section 1.3 above broadly argues for the inclusion of these key constructs, and the remainder of the theory chapters aim to strengthen that argument as well as argue where the constructs should be included in the study. But broadly, this study proposed that the influence of these constructs be tested through the model shown in Figure 1.5 below.

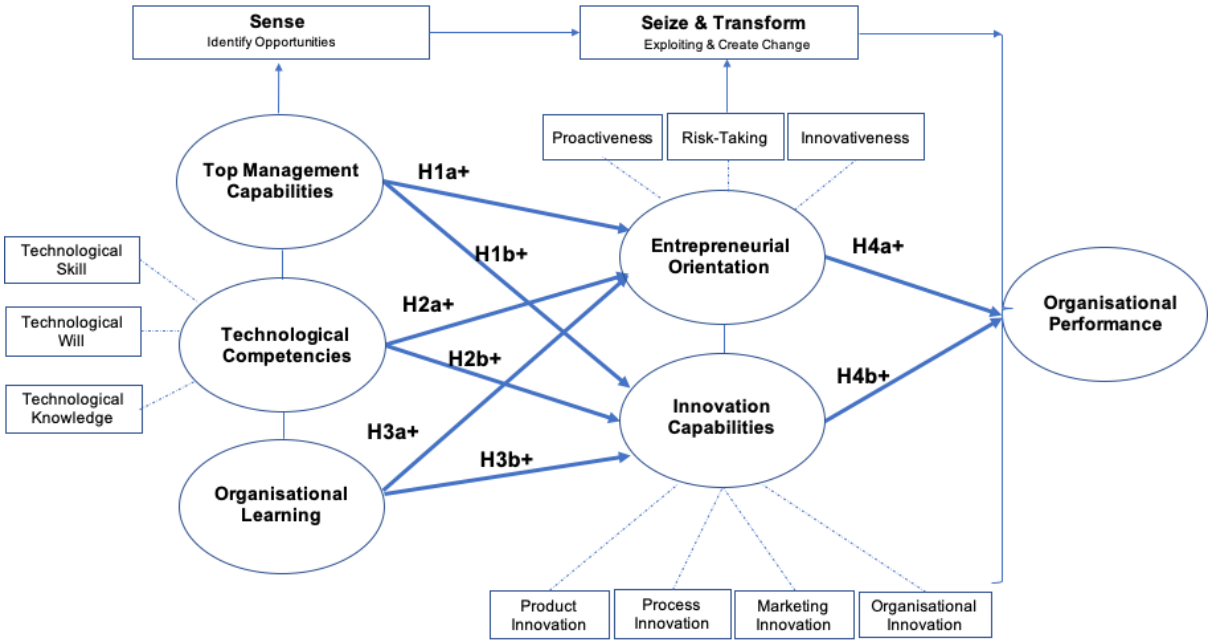


Figure 1.5: Hypothesised model for the study

1.5 THE SIGNIFICANCE OF THE STUDY – SCIENTIFIC MERIT

This study sought to determine how a comprehensive set of capabilities drove tech startup performance and more specifically how a comprehensive set of capabilities strengthened the impact, if any, of both innovation capabilities and entrepreneurial orientation on tech startup firm performance in four African countries (Nigeria, Ghana, Kenya, and South Africa) by surveying tech startups exposed to both traditional and capabilities-based approaches to attaining tech startup performance. Information on the effectiveness of these approaches in enhancing startup performance could provide helpful insights into the use of comprehensive capabilities-based approaches to fostering tech startup performance in future. Furthermore, by understanding this, the study builds on Teece's SST dynamic capabilities-based theory as well as Schumpeter's theory of entrepreneurship and innovation, or Schumpeter's theory of creative destruction, as it is sometimes referred to, by introducing a comprehensive capabilities-based approach to performance development. This study sought to shed light on the capabilities needed to strengthen the impact of both entrepreneurship and innovation on tech startup performance, a gap in knowledge clearly lacking in Teece's SST dynamic capabilities-based theory (Tuluce & Yurtkur, 2015; Teece, 2018; Vaznyte & Andries, 2019).

Second, this study, by conceptualising a comprehensive look at both entrepreneurial orientation and innovation capabilities (linked individually to improved firm performance in previous studies), employed a measure that affords a robust and complete determination of the effect of a complete set of drivers on tech startup performance. A gap in knowledge is clearly lacking in Schumpeter's theory (Martin-Rojas et al., 2015; Ganzer et al., 2017).

Third, this research utilised a cross-sectional study across four key countries in Africa, namely South Africa, Nigeria, Kenya, and Ghana, nations that represent the cornerstone of innovation on the continent (Liquid Telecom, 2017), to determine the effect of top management, technological competence and learning on strengthening the impact of entrepreneurship and innovation on tech startup performance in a manner that sheds light on some possible differences and/or similarities between the different economic environments. This study is therefore likely to provide comprehensive insights into what drives tech startup performance for scholars, policy makers and industry experts in Africa where research is simply scarce and largely unavailable (Ganzer et al., 2017; Medcof, 2017) as summarised in Table 1.2 below.

Table 1.2: Summary of potential benefits for various stakeholders

Stakeholder	Potential value derived from the study
Tech startups entrepreneurs in Africa	Research findings for entrepreneurial knowledge development towards successful technological innovation and startup success across the continent.
South African National System of Innovation	South African Government: increased knowledge of capabilities needed for execution on national innovation objectives. South African Tech Startups: superior competitive advantage from innovation and entrepreneurship as quantified by the Competitiveness Reports and Global Entrepreneurship Monitor Reports fashioned by the World Economic Forum and Global Entrepreneurship Monitor Consortium, respectively.
The Nigerian National Innovation System	Nigerian Government: increased knowledge of capabilities needed for execution on national innovation objectives. Nigerian Tech Startups: superior competitive advantage from innovation and entrepreneurship as quantified by the Competitiveness Reports and Global Entrepreneurship Monitor Reports fashioned by the World Economic Forum and Global Entrepreneurship Monitor Consortium, respectively.
Science, Technology and Innovation System (STI) of Ghana	Ghanaian Government: increased knowledge of capabilities needed for execution on national innovation objectives. Ghanaian Tech Startups: superior competitive advantage from innovation and entrepreneurship as quantified by the Competitiveness Reports and Global Entrepreneurship Monitor Reports fashioned by the World Economic Forum and Global Entrepreneurship Monitor Consortium, respectively.
Science, Technology and Innovation System (STI) of Kenya	Kenyan Government: increased knowledge of capabilities needed for execution on national innovation objectives. Kenyan Tech Startups: superior competitive advantage from innovation and entrepreneurship as quantified by the Competitiveness Reports and Global Entrepreneurship Monitor Reports fashioned by the World Economic Forum and Global Entrepreneurship Monitor Consortium respectively.
Academia in entrepreneurship	Improved significance of research in the field of entrepreneurial orientation (EO) of technology startups in complex developing economic environments and their entrepreneurial activities because of clearer attention on what truly drives EO.
Academia in innovation capabilities	Improved significance of research in the field of innovation capabilities (IC) of technology startups in complex developing economic environments because of a clearer attention on what truly drives IC.
Academia in organisational technology drivers	Improved significance of research in the field of organisational technology drivers in startups based in complex developing economic environments because of a clearer attention on what to foster to improve a startup's chances of success.
Science councils	Dedicated career, specialised and individual development of scientists aspiring to be entrepreneurs and leaders of innovation in technology environments.
Leaders and departmental HODs responsible for startup orientation and innovation.	A crucial base of knowledge and information for bespoke implementation in support of achieving tech startup strategic goals and objectives. Focused direct financial and non-financial investment into organisational learning and tech skills & competency development.
Learning and development practitioners/service providers in startups.	A rigorous program design with various options for learning, backed by scientific knowledge and research. Metrics and numerically based targets to assess impact of organisational learning and development activities implemented in key areas of the startup.

Stakeholder	Potential value derived from the study
Tech startup incubators and accelerator	A rigorous comprehensive capabilities-based approach with various options for incubators and accelerators created to help develop and mentor tech startups, backed by scientific knowledge and research.

This empirical investigation sought to guarantee the understanding of these relationships across different African markets from which entrepreneurs, technologists, policy makers and scholars would most certainly derive value.

1.6 DELIMITATION OF THE STUDY

The study of comprehensive drivers or comprehensive strategic approaches to fostering tech startup performance is novel and unusual (Martín-Rojas et al., 2013). The structured understanding of what internal strategic approaches drive innovation is a fairly new, multifaceted and quite a complex field of research for technology startup scholars (Ganzer et al., 2017; Teece, 2018; Martín Rojas et al., 2011a; Martín Rojas et al., 2011b). This is especially true in Africa, where scholars are undoubtedly confronted with a low availability of publications and shared terminology (Ganzer et al., 2017), a minimum requirement usually deemed essential for the scientific enquiry of complex phenomena. (Malhotra; 2015; Ganzer et al., 2017).

Though the focus of the study was clear and concise, the approach had to delve into literature covering startup performance in general. Consequently, this section will comprehensively discuss areas of research that have been excluded from the study:

- Identifying what drives entrepreneurship has attracted scholarly research of late but largely in non high-technology settings and has also proposed moderating effects of knowledge at team and departmental levels (Teece, 2018). These have been excluded from the study as tech startups are not structurally advanced enough to differentiate between teams and departments.
- Tech/internet startups specifically are defined in this study as firms whose primary mode of conducting business and delivering products and services to their customers is predominantly digtal or through the internet. Care must therefore be taken when applying the findings of this study to other types of startups in general that have no tangible expression in conducting business in purely digital environments.
- Other variables, such as the specific financial amounts of funding made available in a financial year for these startups to execute on a set of business objectives were excluded from this study.

Furthermore, the study excluded any climate, startup political ties or any other external environmental factors as those are erratic, ever evolving and tough to measure (Zhang, Qi, Wang, Zhao, & Pawar, 2019). No information was gathered on these particular elements.

1.7 MAIN ASSUMPTIONS OF THE STUDY

This study assumed that tech startups who participated in the survey were comfortable sharing their perceptions on capabilities within their tech startups that other tech startups in previous studies had considered relevant, interesting, and accessible in the study of tech startup performance. The study further assumed that the individuals working in those tech startups with traditional approaches would use any new approach in their quest for attaining improved tech startup performance, which could include a comprehensive capabilities-based approach as well.

1.8 COMPONENTS OF DOCTORATENESS

Several scholars in the field of doctoral research have endeavoured to put forward a scientific approach and a components-driven strategy of thesis-based observations and feedback to help define the factors that constitute doctoral study (Trafford & Leshem, 2009; Poole, 2015; Wellington, 2013; Yazdani & Shokooh, 2018; Denicolo & Park, 2013). 'Doctorateness' is defined as a combination of several components that can only be wholly appreciated when all the components are not only alive in the study but tailored together (Trafford & Leshem, 2009; Poole, 2015; Wellington, 2013; Yazdani & Shokooh, 2018; Denicolo & Park, 2013). This suggests that aspects of a scientific enquiry are mutually symbiotic in a web of moving parts that have connections and relationships within a study. The term is relatively new but quite an elusive concept only recently documented in doctoral literature (Yazdani & Shokooh, 2018).

Trafford and Leshem (2009) place significant emphasis on a 'stepping stones' model that encompasses 12 aspects of research activity that can be described as "pieces of a puzzle" and that doctorateness is then rendered present when congruity between key elements is shown (Trafford & Leshem, 2009). They regard a clearly defined conceptualisation and a conceptual framework in a study as a clear indicator of the doctorateness of a thesis (Trafford & Leshem, 2009).

Other scholars such as Denicolo and Park (2013) argued that though they agreed that congruity between components is essential, it is not a satisfactory enough benchmark to decisively conclude whether a paper is at a doctoral level or not. They strongly believed that the attributes of the actual researcher were crucial as well and not only his/her own doctoral output (Denicolo & Park, 2013). It is therefore argued that a research development framework be employed which encompasses a mix of the personal attributes of the researcher as well as his or her output (Yazdani & Shokooh, 2018).

The framework argues a blend of behaviours, knowledge, and attributes that supervisors should expect at various stages of the doctoral journey (Yazdani & Shokooh, 2018).

Wellington (2013) suggests five distinct areas of focus for determining the doctorateness of a study. These include: the purpose of the doctoral study, the impact of doctorates; written regulations for the award of the doctorate; the examination process, and the perspective and knowledge of the examiners (Denicolo & Park, 2013; Yazdani & Shokooh, 2018). He further argued that the contribution of the scientific enquiry at this level should have qualities of either novelty or publishability (Wellington, 2013).

Yazdani and Shokooh (2018) conducted a comprehensive literature review in the field of doctorateness, delineated certain key common patterns, messages, and themes, and suggested a conceptual framework within which to analyse the doctorateness of a study through the lens of five conceptual areas. Figure 1.6 below, taken from Yazdani and Shokooh's article titled "Defining Doctorateness: A Concept Analysis", comprehensively summarises and cites sources that define these five key conceptual areas, split into categories, subcategories, and attributes.

Yazdani and Shokooh (2018) propose a summary of the components of doctorateness as follows:

- The purposes of a doctoral study or doctorateness are scholarship to and stewardship of the discipline; personal growth and development and standing in the scientific and professional knowledge community.
- The processes of a doctoral study or doctorateness are formal, lengthy, involve an apprenticeship, experience, socialisation, and change and development of the researcher. The outputs of a doctoral study or doctorateness are a graduate, a dissertation, and a degree.
- Graduates of a doctoral study must display doctoral competence in research and teaching competencies, in combination with a mastery of the self-discipline, subject discipline, higher-order thinking capabilities and a doctorateness identity in both a social and psychological sphere (Trafford & Leshem, 2009; Poole, 2015; Wellington, 2013; Yazdani & Shokooh, 2018; Denicolo & Park, 2013).
- The researcher must display insight and wisdom throughout the journey, especially at completion of the thesis (Trafford & Leshem, 2009; Poole, 2015; Wellington, 2013; Yazdani & Shokooh, 2018; Denicolo & Park, 2013).
- The length of the study must satisfy examiners and demonstrate conceptualisations and frameworks that portray attributes of originality/novelty and publishability (Wellington, 2013; Yazdani & Shokooh, 2018).

- Upon completion, the doctoral graduate would have obtained the highest degree qualification a higher education institution can offer and would have attained the merits to be classified as an independent scholar.

Figure 1.6 below displays a conceptual framework for determining the doctorateness of a thesis.

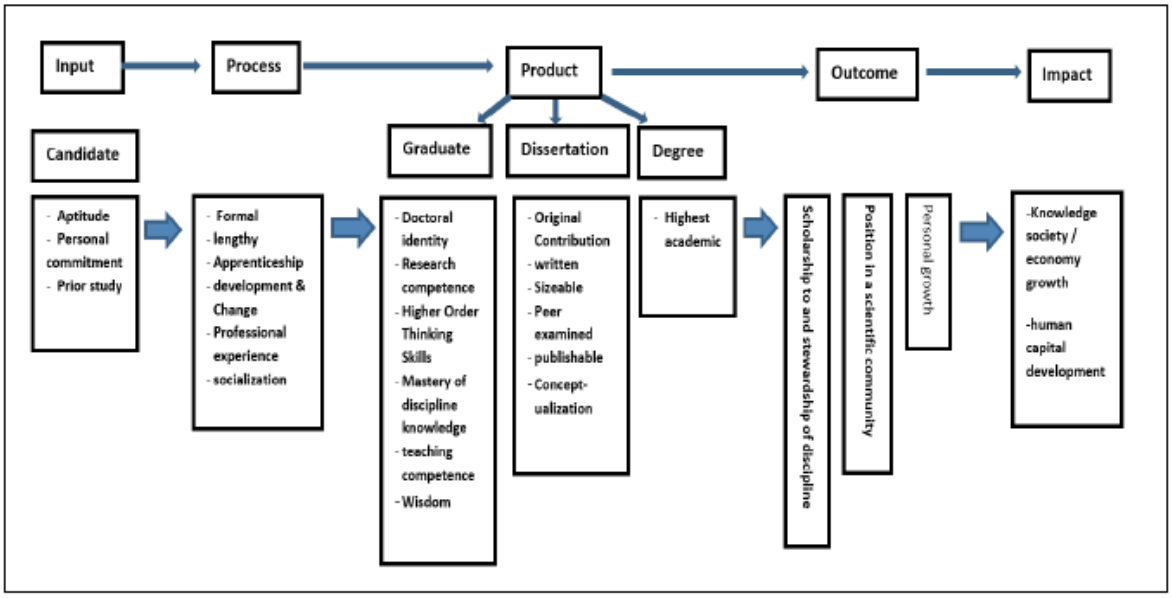


Figure 1.6: Conceptual model for 'doctorateness' of a thesis (Yazdani & Shokooh, 2018)

Doctoral research should fill a certain gap in knowledge, or a gap in professional practice that is deemed worth of scientific enquiry (Trafford & Leshem, 2009; Yazdani & Shokooh, 2018). This involves gaining knowledge through reviewing several published studies, constantly thinking and developing perspectives based on subjective experiences, creating perspectives based on theory on the subject from which, at a certain point in the study, a conceptual model materialises to steer the research design chosen, the methodology employed, and the data collection methods used (Trafford & Leshem, 2009; Yazdani & Shokooh, 2018).

Below follows a perspective on how 'doctorateness' was created in this study:

- The gap in knowledge and literature that this study sought to bridge is stated as the vagueness perceived by tech startups and other stakeholders interested in this space about the drivers considered to be mandatory for successful fostering of a firm's entrepreneurial orientation and innovation capabilities simultaneously, at a time when the African continent is desperately trying to find empirically proven answers as to why startups fail.
- The question this thesis sought to answer was:

What is the effectiveness of a comprehensive set of internal dynamic capabilities, namely top management capabilities, technological competence, organisational learning capabilities, entrepreneurial orientation and innovation capabilities on enhancing tech startup performance?

- Chapter 7 puts forward a comprehensive model that is first stated as a hypothesised model in Chapter 5, and which was comprehensively revised and ratified in the literature review chapters, Chapter 2 to Chapter 5, to steer the review and endorse the knowledge gap the study sought to fill.
- To fulfil the components of 'doctorateness', a research design must be clearly presented in a study. This study employed a non-experimental correlation design on a quantitative survey method as discussed in Section 6.4 below.
- The appropriate methodology in this study was based on quantitative methods from a quantitative paradigm and anchored on a post-positivist paradigmatic location (Section 6.3).
- The process of collecting data for this study comprised of quantitative research survey measurement instrument used with respondents recognised through stratified random sampling (Section 6.9 below).
- The main findings from the study are comprehensively presented in Chapter 7 and Chapter 8.
- A complete commitment to the theoretical foundations of this thesis was established through an integrative drivers' model that comprises several strategic technical organisational approaches that startups should employ to foster a successful entrepreneurial orientation and build innovation capabilities.
- The arguments put forward throughout the study stem from the presented conceptual model employed in Chapter 6.
- Research questions put forward in earlier sections of this study are comprehensively answered.
- Introductions and conclusions are drawn in every chapter, leading up to the conceptual conclusions drawn from the final chapters in the study.
- The impact of the scientific enquiry this study is expected to fulfil includes the identification and description of startup dynamic capabilities deemed to be compulsory for successful fostering of tech startup performance. The prerequisite model is presented in Chapter 1 and in Chapter 5.

The components stated in the bullet points above are integrated through synergistic and argumentative approaches in the corresponding chapters and can be connected to an integrative

philosophical framework. Figure 1.7 below specifies a comprehensive visual description of how the chapters in the study, the suggested frameworks and overall research can be viewed from an amalgamated and integrative standpoint.

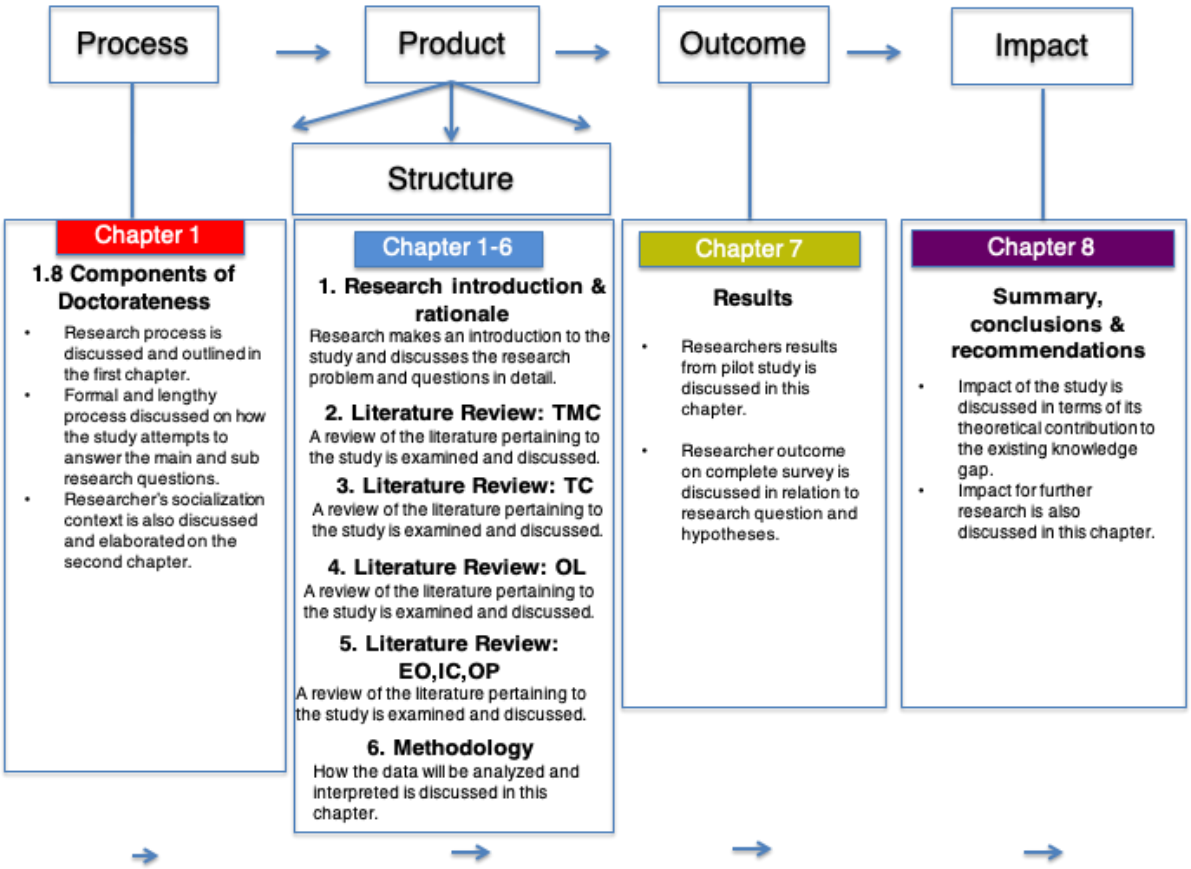


Figure 1.7: Conceptual model for 'doctorateness' of this thesis

The components of doctorateness as discussed above are displayed as a substructure in Figure 1.2 are applied to this study and deliberated in more detail in the sections that follow.

1.9 CONCLUSION

This chapter comprehensively highlights the importance of the improved performance of technology starts-ups within a universal international context and, more specifically, how this translates to an African societal context. This chapter set out to explain why the innovation capabilities and entrepreneurial direction of startups are appreciated as a strategic priority for the survival and development of these firms in very fierce competitive environments. As the body of knowledge on tech startup performance literature continues to grow and consequentially pressure from knowledge professionals continues to increase, the need for empirically proven resources and results has become paramount. Therefore, this chapter sought to highlight the significance of a renewed scholarly interest

in understanding what tech startups specifically need to do to effectively drive performance globally. The chapter highlighted more explicitly the need to bridge the knowledge gaps that exist between the organisational technology drivers deemed essential to strengthen the impact of both the entrepreneurial orientation and innovation capabilities of tech startups on performance, given that tech startups who are entrepreneurial and innovative by nature still continue to fail, even more so in the African tech startup context.

This chapter highlighted the problem identified in this study and summarised the study's problem statement by explicating that tech startups rely heavily on a multiplicity of internal and external variables to foster organisational success in high-tech environments and that new skills and competencies are needed to foster improved performance in tech startups. Unfortunately, however, scholarly knowledge on the precise combination of organisational technology drivers needed to foster entrepreneurial orientation and innovation capabilities as a precursor to improved organisational success is not readily available yet and is certainly not available in the African context. This chapter used this argument to provide a persuasive illustration of the need for this study.

In summary, the background and context comprehensively discussed in this chapter provide a compelling case for finding out the combination of drivers needed for fostering a successful entrepreneurial orientation and sustained innovation capabilities in African startups. An integrative framework was discussed and conceptualised not only to emphasise the doctorateness of this study but to portray fundamental elements of the study that make a strong contribution to the existing body of knowledge on entrepreneurship and innovation. This chapter also provided a provisional conceptual model that considers a suite of organisational drivers, suspected but never proven to drive innovation, as a means of building a conceptual view of how these might interact to foster entrepreneurial orientation and innovation capabilities in startups. The framework in Figure 1.2 above shows how chapters will be integrated throughout the study, how this integration succinctly answers the stated research question, and how the study intends to provide a novel understanding for startups to imitate and apply in pursuit of a culture of entrepreneurship and technology-based innovation in complex emerging environments.

This chapter introduced the direction and focus of the study; the key areas of focus in the study to identify the key drivers deemed necessary for the successful fostering of a startup's entrepreneurial orientation and innovation capabilities. It stresses why understanding this empirically is crucial in understanding why there is a prevalent high rate of startups in Africa that collapse within their first two years, especially considering uncertainty acknowledged by tech startup enthusiasts and professionals across the continent and globally.

This chapter included the problem of the study and problem statement, the research question and its significance, the research delimitations and assumptions, and the components of what makes this study a doctoral research study.

1.10 ORIENTATION TO FORTHCOMING CHAPTERS

The study report is organised in eight chapters. The current chapter presents an introduction to the study and summarises its rationale and introduces its areas of focus. It is followed by Chapter 2 right through to Chapter 5, in which literature related to top management capabilities, technological capabilities and organisational learning capabilities, innovation, entrepreneurship and tech start performance theory is discussed, culminating in the conceptual framework of the study discussed at the end of Chapter 5. Chapter 6 then provides a description of the research design and methodology employed in this study. This includes information about the data collection process, the pilot study and data analysis procedures used in the study. The research results are presented in Chapter 7 and a summary, implications, recommendations and conclusions follow in Chapter 8.

CHAPTER 2 :

LITERATURE REVIEW: TOP MANAGEMENT CAPABILITY AS A DRIVER

2.1 ORIENTATION TO THE CHAPTER

In this chapter a review of the latest thinking in management capabilities literature and how these have evolved in high-tech industries is analysed and discussed. In addition, insights and conclusions drawn from the literature review process are discussed and an orientation to the following chapter is shared at end of this chapter.

2.2 INTRODUCTION

Several factors, including a lack of funding, a lack of infrastructure, poor product market fit, lack of technological capabilities, marketing capabilities, management capabilities, and types of approaches could influence the performance of technology startups (Teece, 2018; Singh et al., 2019). A review of literature seems to suggest that the development of the capabilities of the leadership team in small, dynamic businesses is the bedrock of their ability to disrupt incumbent organisations in this space (Ganzer et al., 2017; Teece, 2018).

The rise and the proliferation of technology-based startups because of rapid technological advancements over the last three decades have had a significant impact on individuals, firms, and civilisation (Martín-Rojas et al., 2016; Tuluce & Yurtkur, 2015; Monteiro et al., 2019). Specifically, the early and rapid proliferation of the convenient personal computing system radically transformed the way businesses were managed and led (Hernández Linares & López Fernandez, 2020; Teece, 2018). The management of high-tech ventures in today's business environment encompasses technology, innovation systems, management competencies and dynamics as interdependent mechanisms of an organisation (Khobai et al., 2018; Helfast & Raubitschek, 2018). Consideration of the interdependent relationships among some of these elements is crucial for the successful development of 'creative destruction' in high-tech industries. This entails the acknowledgement that for economies to grow and for existing businesses not to become complacent, there needs to be an obliteration or sometimes a radical renewal of existing processes to make way for new ideas and new ways of doing things, especially within high-technology business environments (Martín-Rojas et al., 2016; Ruiz-Jiménez, Fuentes-Fuentes, & Ruiz-Arroyo, 2014; Ganzer et al., 2017; Martens et al., 2018).

In particular, the ability to understand to what extent the capacity of a management team in a startup helps drive and foster its growth and success will be essential for tomorrow's high growth technology

entrepreneurs, startup managers, and other actors in the entrepreneurship and business venturing value chain (Azar & Ciabuschi, 2017; Helfast & Raubitschek, 2018).

The following sections therefore examine and review the literature on the effects of top management capabilities as a driver of tech startup performance and entrepreneurial orientation as driver of tech startup performance as viewed traditionally and assess dynamic capabilities-based approaches as well. This chapter provides an argument for top management capabilities as part of the theoretical grounding for this study, which is then further substantiated in the chapters that follow.

2.3 TOP MANAGEMENT CAPABILITIES AS A DRIVER

Over the last three decades, social scientists have placed significant emphasis on the impact of advanced technologies in various spheres, including the standard of life experienced by people, the structure and dynamics of the working environment, productivity levels, efficiencies, national economic imperatives, and socio-political landscapes within different business communities. Various scholars from different disciplines of research have placed significant emphasis on the inter-relationships between strategy, management, and business venturing in highly technical business environments (Martín-Rojas et al., 2016; Tuluce & Yurtkur, 2015; Monteiro et al., 2019). One of these areas of special interest has included the influence of top management on the diffusion of new technologies in startups and the individuals within these firms and the implications of a highly technological, ever-changing environment for the strategic management of these technology businesses today, and in the future (Martín-Rojas et al., 2016; Pantano & Vannucci, 2019).

The sections below examine strategic traditional and more dynamic top management perspectives, which view the knowledge, skills, and aptitude of the most senior managers as one of several interrelated aspects of an organisation that assist the firm in remaining competitively relevant and developing productivity and long-term organisational success.

2.3.1 Traditional approaches to top management capability as a driver

A startup's values, pronouncements and activities stem from the highest level of management, who are in the most influential positions to affect any form of rejuvenation within a firm, and effectively executing on these values and practices could have positive effects for an organisation's survival (Martín-Rojas, 2016; Crescenzi & Gagliardi, 2018; Noori, Bagheri Nasrabadi, Yazdi, & Babakhan, 2017; Ganzer et al., 2017). Thus, the importance of the executive team's ability to be intrinsically involved in the allocation process of technological resources and the diffusion of new strategies becomes crucial in redefining an organisation's strategic response to novel technological models and external market forces (Medcof, 2017). Traditional approaches to management capabilities relied heavily on top-down

management styles where top managers were hardly involved in the day-to-day detail but still made decisions that were oversimplified and unfavourable for the firm (Crescenzi & Gagliardi, 2018). However, many scholars argue that in current startup environments where digital strategies have become part of how businesses operate, the executive team's imperative to ensure that technology is effectively disseminated across the organisation has become indispensable (Ganzer et al., 2017). As a result, some researchers have alluded to the idea of the development and fostering of management capabilities that allow top managers to be more involved as a means of creating a competitive advantage (Martín-Rojas, 2016; Ganzer et al., 2017; Pantano & Vannucci, 2019).

Research has shown that traditional approaches to top management capability as a driver of tech startup performance have in some cases proven to yield positive performance results in certain contexts (Medcof, 2017). However, due to their non-collaborative nature and inability to encourage horizontal decision making in firms, other researchers argue that even tech startups with the best technologies have been unable to identify, exploit and commercialise new opportunities simply because the team lacked the correct combination of management capabilities needed to sufficiently maximise these opportunities (Crescenzi & Gagliardi, 2018; Noori et al., 2017; Monteiro et al., 2019). This has led researchers to conclude that companies with a dynamic managerial approach to problem solving are better placed to improve their strategic options and to develop and disseminate new knowledge across the entire organisation – a massive benefit for businesses still in development stages and for firms that lack structure (Martín-Rojas et al., 2016; Ganzer et al., 2017; Teece, 2018).

It is for this reason that section 2.5 below discusses a comprehensive dynamic capabilities-based approach to top management capability as a potential way to foster performance in African tech startups.

2.3.2 Top management capability as a driver of 'creative destruction'

Top management's commitment to building an innovative and competitive organisation has on several occasions surfaced due to the significant importance it places on the dissemination of technology in various forms within the organisation (Martín-Rojas et al., 2016). As much as the effort to solve the consequences of hierarchical structure in companies has proved futile, companies tend to adapt instead to such a structure by downsizing and laying off staff. Managers have recognised the importance of observing and managing organisations' processes while focusing their attention on the vertical relationship of the classical hierarchical structure (Martín-Rojas et al., 2016). Information and requests for resources are therefore pulled to the top of the organisation, which makes it easier for the corporates to make decisions that drive resources and control on responsibilities down to the frontline units. Nonetheless, horizontal processes have proved to offer quality management since they

cut across the boundaries of the organisational units while paying attention to the quality of the company's products and activities (Tuluce & Yurtkur, 2015; Pantano & Vannucci, 2019).

Consequently, the review of the academic literature seems to suggest that managers may need to focus more on the process rather than the structure. It suggests that their view go beyond the popular reengineering of work activities. Processes dominate the organisational structure and envision creativity and entrepreneurship of the firm. Top management should see beyond power and for instance figure out processes that aim at promoting continuous renewal of the strategies and ideas that drive the business. Management capabilities affect both the process innovation and product, which also involves the gender balance at the top management structure. The technical, human, and conceptual abilities integrated towards configuring the organisational resources require balanced and competitive minds which should not be gender biased (Bellner & MacLean, 2015). From a theoretical perspective, management capabilities enhance the establishment of a dominant logic in companies that takes tangible form in their procedures, routines and capabilities that influence the strategic implementation and options aimed at growth and innovation.

According to Bellner and MacLean (2015), top management capabilities can be enriched through the incorporation of advanced research on the top management team since the teams lead the growth of the organisation and its adaptation to strategic changes. In the upper echelons theory (UET), information interpretation that surrounds top management teams depends substantially on personal experience of the people involved, their personality and values. The relationship between management capabilities and performance is achieved by considering the characteristics of the top management team. The team is responsible for the analysis of the influence that the management capabilities have on innovation performance in technologically based startups and the role of gender diversity of the top management team, which acts as the moderating variable. Management capabilities contribute to better understanding of the factors that enhance greater organisational achievements and emphasise the need to analyse the role of top management teams extensively (Bellner & MacLean, 2015). For instance, flexibility and stronger participation by top management teams in the firm's processes are critical in decision making of the firm.

Managers are expected to employ their capabilities to design strategic processes and promote organisational skills that will result to the innovation and growth of the firm. They can configure, construct and integrate organisational resources and competencies. These capabilities are essential, since they enable top management teams to face environmental setbacks, enhance performance and create competitive advantage.

Throughout history in the area of economic development and management literature, scholars have looked at the capability of managers within organisations as drivers of change and impact not only internally but also externally (Hiebl, 2017; Schuster & Rueck, 2017; Martín-Rojas et al., 2016; Teece, 2018). The idea that the levels of management within small organisations are significant was first recognised and suggested by Hiebl (2017), who argued that the role top management plays in the organisation's ability to rise above cultural, organisational, internal, and external challenges is crucial for the firm's survival (Hiebl, 2017). Besides, the argument was based on certain required traits possessed by staff members that could make it easier to implement some essential decisions for the success of the organisation (Hiebl, 2017). Several researchers have agreed and expanded on this view in recent years (Martín-Rojas et al., 2016; Singh et al., 2019; Deligianni et al., 2019).

There is a heavy reliance on the top-level management's ability not only to support technology dissemination from the top down, but also to effectively accumulate new technology ideas from far down in the organisation to empower staff members in the organisation (Martín-Rojas et al., 2016). Occasionally, top management depends on staff members' creativity and disclosure of ideas to implement them, thus making everyone in the organisation equally important.

In the early 2000s, several researchers in the field of technological innovation began investigating the factors that affect an organisation's conductivity for technology adoption and what the key drivers of technological diffusion were within high-tech organisations (Hadrawi, 2019). These early researchers found that an organisation's ability to take technological adoption direction from its leaders at the highest levels had a significant effect on its ease of technology adoption and consequently its ability to outperform its competitors (Hadrawi, 2019).

The literature argues that specific technological skills are closely aligned with the technological competence (TDCs) phenomenon, as competencies are a derivative of specific kinds of technologies or knowledge-based constituents and exist as a combination of both technology and skills, as suggested by not only Schaupp and Virkkunen (2017), but also by Adewale and Babatunde (2015) in the late 2000s. Highlighting these elements is crucial, since the real cradles of benefit are present in the top leadership's ability to amalgamate various technologies and skills into competencies that motivate startup organisations to acclimatise quite rapidly to novel prospects across the organisation (Schaupp & Virkkunen, 2017; Hadrawi, 2019; Martín-Rojas et al., 2016).

Scholars researching the organisational capabilities needed for organisational success in Silicon Valley startups and how they are funded identified that initial funding from angel investors, financial institutions, etc. is crucial (Zhang, Wong, & Ho, 2016). They argued that once that initial round of

funding had been absorbed in the organisation and the business was up and running, key leaders and influential executives in the firm were required to focus their endeavours squarely on managing and supporting the dissemination of technology in the organisation as it strongly influenced their mental ability not only to identify opportunities but also to exploit them effectively (Zhang et al., 2016).

Such commitment to technology from high up in the organisation is important for startups looking to provide an enabling environment for employees to create innovative technologically superior products and services (Adewale & Babatunde, 2015; Martín-Rojas et al., 2016). Researchers have argued that decision-making processes on matters involving technology improve drastically as a result and assist the firm in attaining a competitive advantage over its peers (Hsu & Chen, 2019). Top executive-level support for technology is vital in assisting employees within tech startup organisations to make sense of the organisation's chosen strategy as well as assisting the firm to improve its chances of long-term success (Deshpande, 2018).

Over the last few decades, research in the field of management theory and technological innovation has placed a significant amount of focus on the highest tier of management within an organisation as a driver of technology diffusion within small and large organisations (Schaupp & Virkkunen, 2017; White & Molly, 2019; Hadrawi, 2019; Martín-Rojas et al., 2016). In technology-driven startup firms where top management involvement is crucial, their commitment to creating an organisation where technology forms the basis of their ability to think outside of the box is exponentially more vital to the success of the firm (Hadrawi, 2019). Spending time understanding theoretical foundations of management involvement in innovation is crucial.

For firms to shape and improve their entrepreneurial orientation, research has alluded to an intrinsic need for individuals and employees within an organisation to foster a culture of constantly acquiring unique and particular knowledge (Sturdy & O'Mahoney, 2018; Martín-Rojas et al., 2016). Organisational learning as a process has been defined over the years as ceaseless process rejuvenation over a long period of time, allowing novel ideas, procedures and know-how within the organisation room to cultivate in order to gain sustainable business advantage, enhance its efficiencies and its ability to use knowledge to achieve organisational superiority amongst competitors (Sturdy & O'Mahoney, 2018; Braver & Danneels, 2018; Martín-Rojas et al., 2016).

In the early 2000s, Zahra (2008) as well as other researchers propagated the idea that an organisation that invests heavily in its ability to foster learning through the diffusion of technology is better placed to promote a risk-taking culture through the strategic transformation of their existing procedures and processes (Ma, Liu, & Karri, 2016; Soleimanof, Singh, & Holt, 2018; Martín-Rojas et al., 2016).

Understanding the importance of not only top-level management support for technology but also the importance of developing key technical skills, knowledge and distinct competencies within an organisation (Schaupp & Virkkunen, 2017; Adewale & Babatunde, 2015), and understanding the inherent potential it has to develop a startup organisation's entrepreneurial orientation, must beg the questions: How do we then effectively invest specifically in technology? Will this investment in technology influence a firm's entrepreneurial orientation and its innovation capabilities? The discussion around an organisation's investment in technology and its consequent results has occupied the minds of several scholars in the field for years. Sanders (2018) and Martín-Rojas et al. (2016) have attempted to demonstrate that the effectiveness of an enterprise's investment in technology has a strong relationship with a set of technological capabilities particular to the firm. Anjos (2016) also argued that an enterprise's technological capabilities must focus on the development of more intrinsic kinds of knowledge that are crucial to maximising the firm's ability to succeed when undertaking any form of investment in technology. The crux of any form of investment for a business is centred on its ability to gain substantial returns or make profits from said investments; however, findings regarding the effect of investment in various technology variables directly on a firm's return on investment have been inconsistent (Polák, 2017; Martín-Rojas et al. 2016).

Researchers have attempted to explain the inconsistencies but have struggled to come to an agreement around the specific elements driving these relationships and these have been attributed, to an extent, to the conflicting theoretical frameworks used by different scholars in the field at the time (Yilmaz, 2020).

Several studies have also shown that more specifically the size, scale and type of a firm's investment in technology, supported by those in the highest levels of management, have had positive effects on its R&D spending but have not directly been able to show the effects these large investments in technology have had on a firm's entrepreneurial orientation or innovation capabilities and consequently its ability to effectively commercialise new ideas and inventions. Several researchers have suggested that a firm's entrepreneurial orientation has positive effects on the organisation's ability to perform but there have been zero discussions to date as to whether certain internal variables have been the drivers of this process.

As early as 1999, several scholars in the field of technological leadership and the influence this variable had on an organisation's ability to remain technologically competitive alluded to this concept of innovation as a resulting output of said leadership but never empirically studied it (Czajkowska, 2019). Since startup organisations that are heavily reliant on the internet pursue prospects to gain novel resources to accomplish more than their competitors, executives in these organisations are

encouraged by research to always remember that the desire for technology support, through a more collaborative approach as a means of augmenting and capitalising on their internal attributes, fosters and develops an innovative culture within the organisation (Hsu & Chen, 2019; Gnekpe & Coeurderoy, 2017; Martín-Rojas et al., 2016; Chang et al., 2015).

Several researchers in the area of top management capabilities have found that organisations that are able to embrace technology in all its forms are more likely to attain more commitment and support from executives in the organisation (Gnekpe & Coeurderoy, 2017; Hsu & Chen, 2019). This helps improve their reputation across the rest of the organisation and boosts productivity. This is largely because an executive team that embraces the need to improve the firm's technological capability drives change in mindset and outlook across the organisation (Hsu & Chen, 2019; Gnekpe & Coeurderoy, 2017; Martín-Rojas et al., 2016; Chang et al., 2015; Ganzer et al., 2017). Such organisations that embrace technology at the highest levels are not only more forward thinking, but scholars argue that they are more receptive of this change. Furthermore, organisations that embrace technological capability also experience a shift in the innovation culture within the organisation (Ganzer et al., 2017). Technological support from top executives in the organisation augments strategic tactics that help steer the organisation's innovation imperative in the right direction. Schuster and Rueck (2017), Martín-Rojas et al. (2016) and Ganzer et al. (2017) all argue that a disruptive culture is enabled by top management support for technology dissemination in an organisation.

In tech startups, the executive leadership plays a crucial role in attracting and motivating highly skilled experts not only to foster a proactive mindset within the organisation, but also to foster new ways of thinking within the firm (Ganzer et al., 2017).

In a study conducted on a micro-electro mechanical system in the field of pharmaceutics and medical technology by Ahmad (2017), as well as a similar study conducted in the nanotechnology space specifically by Seeber (2016), both studies found that top leadership support and endorsement of technology positively influenced and served as a catalyst for firm performance. Other scholars found that top executives that are technologically literate and savvy, and ones that harness greater levels of know-how when it comes to technology, are more creative in terms of the kinds of operational processes they introduce to novel markets (Zvavahera, Chigora, & Tandi, 2018). They argue that these executives have a higher propensity to attract investment and funding in various forms and consequently participate in more activities and projects that enhance and improve the organisation's attitude towards risk and disruption.

Leadership in technology startup organisations is regarded as extremely significant by several researchers in the field of technology management (Martín-Rojas et al., 2016; Ganzer et al., 2017). These researchers have also argued through evidence that many technology executives at times do not effectively lead the strategic deployment of technology in the competitive standing of their organisations, which speaks to the crucial role executives play in committing to technology as a means of improving the organisational outcomes of the firm (Mazouni, 2018; Gritzo, Fusfeld, & Carpenter, 2017; Balunova, 2017; Ganzer et al., 2017; Tarim, 2015).

In a study of drivers of innovation in technology organisations, researchers expressed evidence of the critical role of senior management in uniting technology with the marketplace through multi-disciplined, extraordinary initiatives. Top managers' significant support for technology has been seen to have positive effects on middle managers in the organisation. Understanding the effect of managers' support for technology on middle managers is crucial, as middle managers with tons of experience, organisational know-how and technical prowess in organisations are the ones that frequently bring new business execution techniques to life (Ganzer et al., 2017; Medcof, 2017).

The support for technology by top management is crucial, as these leaders are the individuals responsible for all technical and technology staff, maintenance staff, for all technical assistance workers as well as individuals in the organisation who are sometimes non-technical in nature. Researchers also argue that in the field of technology management leadership, virtual teams are becoming more prevalent in technology startup organisations as these firms increasingly disseminate their technical know-how across the globe, often in a collaborative fashion. This direction from top management has led to improved products, processes, marketing and organisational innovation in the entire organisation (Péréa & Von Zedtwitz, 2018; Medcof, 2017).

2.3.3 The upper echelons theory

Top management support for technology is associated with the upper echelons theory (UET), which states that organisational consequences, strategic choices and executions are largely foretold by the top management's background characteristics, their values for management and the intellectual basis for these values (Hiebl, 2017). As a result, top managers within a firm act as the catalysts for innovative technology development strategies across the business (Hiebl, 2017; Schuster & Rueck, 2017; Martín-Rojas et al., 2016). Top management's commitment to building an innovative and competitive organisation has on several occasions materialised because of the significant importance the startup places on the dissemination of technology in various forms within the organisation (Martín-Rojas et al., 2016).

This theory has its origin steeped in behavioural theory of the organisation (Mandysová, 2018), which suggests that leaders of firms usually do not make rational and well-thought-out decisions due to their natural limitations as people (Mandysová, 2018). So, when presented with complex business challenges in a highly technical environment, these executives appeal to their experience, preferences, and other biases to address these overloads (Hambrick & Mason, 1984). Furthermore, some executives prefer to make decisions on their own since they believe that they are the head of the organisation and therefore they cannot be advised otherwise by any staff on the lower management levels. Consequently, many organisations have been negatively impacted due to the wrong decisions made in the name of the management level.

The upper echelons theory (UET) states that the more complex a decision, for example the adoption of technology as a means of fostering the creation of disruptive products and services, the more significant the personal characteristics of the decision makers are, such as age, occupancy and specialisation (Martín-Rojas et al., 2016; Teece, 2018). An ideal decision can be made when an organisation considers such factors to avoid misappropriation of information from one department to another. Specialisation is more important for effective and efficient production, since an expert can know what is required and when (Teece, 2018). For instance, a specialist in machines of production should be the ideal person to give recommendations regarding the latest machines that aim at increasing productivity while lowering the cost of production. The principle of UET acknowledges that the personal characteristics of top managers affect their decisions on strategy, and their ability to support technology adoption, and consequently organisational performance (Teece, 2018). Indeed, managers who involve and listen to staff members before making a final decision are likely to make a correct and ideal decision that will eventually play an essential role in boosting the productivity of an organisation. Then again, those who feel that they are liable in making all decisions may get it wrong once, thus negatively impacting the organisation and leading to deficient performance.

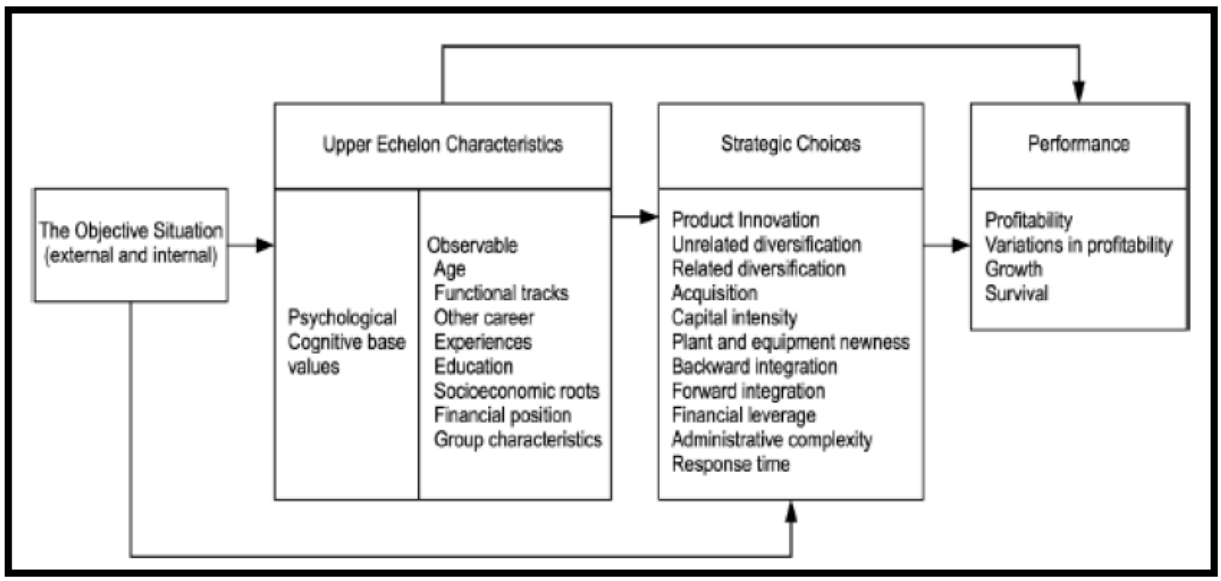


Figure 2.1: Upper echelons theory perspective on organisations (Hambrick & Mason, 1984)

Several studies have drawn on the upper echelon theory of dynamic capabilities, some examining the relationship between leader demographics and organisational outcomes such as R&D outcomes, corporate disclosure, firm performance, and cash holding. However, the empirical importance of these studies remains largely unknown, predominantly regarding the relationship between top management capability and both entrepreneurial orientation and innovation capabilities. In Africa, more specifically, research of this nature is limited.

It is against this backdrop that this study sought to establish a convergent comprehensive view of Teece's overarching dynamic capabilities theory as a means of fostering tech startup development in way that can answer the question: Would there be any effect on the entrepreneurial orientation and innovation capabilities of tech startups who developed their top management capabilities as a means of strengthening their impact on performance?

The research evidence allowed this study to hypothesise a comprehensive conceptual model for tech startup performance development that included top management capabilities as a potential driver of performance as a way of bridging the knowledge gap identified in section 1.4 above.

2.4 CONCLUSION

The literature review has enabled a deep understanding of and greater insights into the importance of the inclusion of management capabilities as part of a comprehensive approach to performance development. The review highlighted that the lack of consistency in management perceptions in literature could account for the poor performance experienced by tech startups. The review showed a variety of development approaches and implementation models that might have varying effects on

tech startup performance. While the review seemed to suggest that though researchers agree and provide strong arguments on the generation of greater benefits from firms with higher management capabilities, the effect on strengthening the impact of entrepreneurial orientation on performance has not been established indisputably. The evidence seemed to imply that though the top management plays a crucial role in fostering a proactive mind-set in an organisation that revolves around technological orientation and innovative attractions, its empirical comprehensive effect on driving tech startup performance is still unclear.

2.5 ORIENTATION TO THE NEXT CHAPTER

Chapter Three focuses on a review of the literature surrounding technological capabilities and discusses arguments put forward by researchers looking at technological capabilities as a driver in tech startup literature.

CHAPTER 3 :

LITERATURE REVIEW: TECHNOLOGICAL COMPETENCE AS A DRIVER

3.1 ORIENTATION TO THE CHAPTER

In this chapter, a review of the latest thinking in technological competence literature and how these have evolved in high-tech industries is analysed and discussed. Insights and conclusions drawn from the literature review process are discussed and an orientation to the following chapter is shared at end of this chapter.

3.2 INTRODUCTION

Despite the increasing rate of startups, some ventures are unable to hit the market demands and standards because of the lack the technological capabilities to do so efficiently (Pakura, 2020). Research evidence suggests that many entrepreneurs are ready to adopt technology for their respective tech startups but many of them do not know how and in what way to incorporate it in the overall organisation (Martens & Carvalho, 2016). This chapter discusses how this inability to perform implies that to successfully grow tech startups in dynamic business environments, technological competence should form part of the tech startup's overall performance strategy. It discusses different arguments for and against the view that technological competence may strengthen the impact on the entrepreneurial orientation and innovative capabilities of tech startups on their ability to perform.

This chapter reviews the arguments that suggest that technology can be regarded as the central part of growth of any startup business and other arguments that suggest that it is not that simple, with suggestions as to why this is so (Di Paola, Spanò, Caldarelli, & Vona, 2017; Igboke, 2019). Although technology plays an essential role, some arguments reviewed below suggest that for technological competence to be effective it should be correctly applied with the correct personnel equipped with necessary skills, will and knowledge (Ayough et al., 2020; Sturdy & O'Mahoney, 2018; Martín-Rojas et al., 2016). This chapter discusses how the recommended strategies for tech startups to employ is to use technology and innovation to exploit the many benefits ranging from low cost of production to competing favourably in the market. In addition, the chapter also discusses why this has been challenging to achieve for tech startups, particularly those in developing markets.

3.3 TECHNOLOGICAL COMPETENCE AS A DRIVER

Tech startups disrupt the normal way of doing things by using technology to create 1) a new generation of products and services, and 2) designing disruptive methods to get these products and services to their customers (Di Paola et al., 2017). Despite sensing new ways of conducting old business

by such firms, the cost of production is significantly lowered because of technology, a crucial benefit for businesses just starting out (Igboke, 2019). Furthermore, technological capabilities enhance the efficiency of production and the quality of products in a way that reduces future uncertainty (Igboke, 2019). Incumbent organisations are now facing a challenge of either developing technological capabilities or becoming extinct. On the other hand, technology-driven startups also face challenges while venturing into new markets. Research evidence suggests that building the wrong technological capabilities can have an adverse effect on the financial standing of the startup since technological investments for businesses just starting out are often not cheap (Ganzer et al., 2017). Accordingly, research suggests that a comprehensive dynamic capabilities-based approach to technological capabilities may yield more effective results for tech startup development.

Research evidence suggests that three second-order dynamic capabilities, namely technological skills, technological knowledge, and technological will, are crucial in the implementation of comprehensive dynamic view of technological capabilities in any venture (Di Paola et al., 2017). Failure to possess such technological skills as an example will see any organisation in today's world fumble both in production and service delivery, hence limiting its growth potential. Also, the capital required to invest in technology has really drained many entrepreneurs, making them opt for the old technology which in turn fails them when compared to offerings from the competition (Di Paola et al., 2017).

In short, technology can be regarded as the central part of growth of any startup business. Although technology plays an essential role, the implementation of technological capabilities should be correctly applied with the correct personnel equipped with the necessary skills.

3.3.1 Technology skills

Martín-Rojas et al. (2016) simply defined technological skills as specific methods and scientific considerations that individuals within an organisation possess. In simple terms, technology skills entail the abilities and knowledge of the staff to carry out specific duties within an organisation.

3.3.2 Technology will

Organisations are on the lookout for all the possible ways through which they can satisfy their customers' needs to maintain a significant market share and attract more customers to consume their products. All these are based on the 'will' of an organisation to implement decisions and ideas which are viewed as important, and which are consistent with both their mission and vision (Martín-Rojas et al., 2016).

3.3.3 Technology knowledge

The term technology knowledge as used in the literature embraces the necessary knowledge about technology and the ability required in operating specific technologies (Alkhaffaf, 2018). In other words, the term technology knowledge can be used to imply the expertise possessed by an individual that makes him/her confident and comfortable when operating technologies. For instance, an individual being aware of how a certain machine operates with ease and even the ability to locate the exact place to repair during machine failure can be termed as having technology knowledge of that specific machine.

3.3.4 Technological competence as a driver

Technological competencies can be conceptualised based on the literature as the ability of firms to employ methodical and technical know-how through a chain of repetitive tasks and processes to enhance the quality of products and services (Ayough et al., 2020; Sturdy & O'Mahoney, 2018; Martín-Rojas et al., 2016). In the study of what constitutes a firm's core competencies, the aspects of the firm's competencies that pertain to the use and employment of technology have been recognised as one crucial aspect of the enterprise's core competency (Seeber, 2016; Martín-Rojas et al., 2016). Technological competencies are paramount for firms looking to accomplish sustained competitive prowess in their respective sectors or industries by adjusting quite rapidly to shifting prospects (Schaupp & Virkkunen, 2017).

For a better understanding of the antecedents that constitute a firm's technological competencies, researchers have over the years defined it as the ability or know-how of an enterprise to make use of scientific and technical knowledge via a chain of practices and techniques to create and foster new product, service, marketing, and organisational and process innovations (Adewale & Babatunde, 2015; Schaupp & Virkkunen, 2017; Ayough et al., 2020; Martín-Rojas et al., 2016).

Researchers in the field of competencies that are essential to an enterprise's ability to develop a competitive advantage argue that such competencies may be viewed as strategic to the organisation (Martín-Rojas et al., 2016; Seeber, 2016). In the study of dynamic capabilities theory, researchers argue that certain competencies may be recognised as a combination of tangible and intangible resources that amass over a period. Theory around an enterprise's technological competence is coherent with this theory (Yoshitoshi, 2017; Martín-Rojas et al., 2016). This implies that the entrepreneurial orientation or climate is thus improved and fostered if the organisation's technological competencies are encouraged.

Research into the field of technological competencies has shown that these competencies foster engineering and the formulation of unique know-how, product development and patent creation that build entrepreneurship and consequently innovation in the organisation (Danneels, 2016; Medcof, 2017). It is important to understand that an enterprise's technological competencies as a comprehensive dynamic capabilities-based approach are not just "belongings" but are better described as an evaluation framework which is developed by procuring and supplementing a firm's potential over a given period (Schaupp & Virkkunen, 2017). Technological competencies stretching from modest to multifaceted, help increase entrepreneurship within technology startup organisations (Danneels, 2016; Martín-Rojas et al., 2016). An organisation's technological competencies provide a proprietorship mentality that encourages and builds the mindsets of individuals in the organisation to increase the tech startup's chance of outlasting its competitors and securing its continued survival (Schaupp & Virkkunen, 2017; Seeber, 2016). In technological innovation research, the innovative use of technology is a competency that builds sustainability and improves the mind-sets of individuals in startups and their ability to identify and exploit more strategic options (Ndemezo & Kayitana, 2018; Osabutey & Croucher, 2018; Scaringella, Miles, & Truong, 2017; Kashirin, 2018). It thus implies that strategic technological choices and technological competencies have some influence on the ability of individuals in a digital technological startup to foster the organisation's standing in its industry.

Research has also shown that an organisation's technological competencies have the potential not only to affect the organisation's present industry or sector but may also be advantageous to the firm across several industries (Scaringella et al., 2017). This reality is often enunciated in the technological growth and expansion strategy of the enterprise, which delineates the preferred competencies and their effectiveness for growth (Seeber, 2016; Martín-Rojas et al., 2016; Scaringella et al., 2017). Therefore, this implies that there exists a budding appreciation in current research of the impact a firm's technological competencies have on its entrepreneurial climate and possible strategic selections.

High-tech or digital technologically capable organisations with technological competencies play a crucial part in the process of increased innovation since these competencies act as diffusors or novel technologies, as in the case of the nanotechnology and micro-electromechanical systems research mentioned earlier (Ahmad, 2017). These technological competencies are crucial to the firm to act as mediators of proficiencies to the entrepreneurs in the organisation. This is typically what occurs simply because the fostering of innovation and the unearthing of innovation prospects in technology stem from scientific detection, which acts as a fundamentally advantageous window of entrance for potential entrepreneurs (Osabutey & Croucher, 2018). Therefore, for increased innovation in these

digital technology organisations, individuals employed in these organisations need to find and exploit these opportunities that are encouraged by the organisation's desire to pursue and advance its technological competence (Martín-Rojas et al., 2016; Osabutey & Croucher, 2018).

This is particularly important because the research evidence suggests that technological competencies have the capacity to boost the innovation capabilities and output of the firm since research has shown that successful entrepreneurs are able to take advantage of these opportunities through the focused dissemination of technology throughout the organisation (Osabutey & Croucher, 2018). Technological competencies are argued to be an incredible catalyst for higher levels of entrepreneurship as well as increased innovation. Without technological competencies within digital technology organisations, the discovery of prospects and the fostering of a culture of innovation have been described to be futile and a complete waste of time for the enterprise involved in the process (Zvavahera et al., 2018; Osabutey & Croucher, 2018).

Technological competencies, for example the ability of a digital technology startup to build and create novel products and services, are argued to act as a promoter for asset accretion and contribute to firm rejuvenation and products, processes, marketing and organisational innovations in untapped markets (Akolaa, 2018). Technological competencies have not only been described as crucial by several researchers but also as a prerequisite for organisations looking to make informed strategic choices as they act as a catalyst for increased levels of innovation in the firm (Osabutey & Croucher, 2018; Martín-Rojas et al., 2016). The increased innovation an organisation can deliver upon is enabled by its ability to foster a set of key variables, and its technological competence has been described as being the facilitator of this phenomenon (Akolaa, 2018; Martín-Rojas et al., 2016). However, the question still remains unanswered as to what degree the technological competencies of tech startups – as a comprehensive dynamic capabilities-based model – strengthen the impact of the innovation and entrepreneurship capabilities on the firm's ability to perform in African tech startups.

3.3.5 Technological skills in technological competence literature

Tae-Kyung (2017) and Martín-Rojas et al. (2016) have defined technological skills simply as specific methods and scientific considerations that individuals within an organisation possess. The technological skills of managers across the firm are crucial and a necessary condition for the development of a startup's internal culture needed to improve the environment (Tae-Kyung, 2017). Some researchers also argue that technological skills may be needed not only for the development of the environment but could be satisfactory conditions for tolerable development of the environment to certain levels (Du et al., 2016; Martín-Rojas et al., 2016). In addition, several scholars have placed significant emphasis on an organisation's technological skills, which can be defined as its technical

know-how, precise techniques and scientific knowledge (Hadrawi, 2019; Martín-Rojas et al., 2016). A firm's technological skills are very closely aligned with its technologically distinctive competencies Several scholars describe a firm's competency as either being attributed to a form of technology or knowledge-based factors, typically born out of marrying both technology and skills together (Schaupp & Virkkunen, 2017; White & Molly, 2019; Martín-Rojas et al., 2016).

Rising technology and innovation-based startups are significantly employing the need for technology in both production and service delivery. For the smooth and effective running of such entities, the top management should shift to hiring staff with relevant skills to the job of their interest. Since technology is all about the invention of tools and machines from scientific ideas of people, technological skills therefore are often practical. It is from this perspective that technology is largely applied in the production and delivery process rather than consuming of the already produced products. For instance, approximately 90% of productions in any industry are technology based while the technological consumption such as using straws when taking drinks comprises a low percentage. The practical skills of technology refer to several skills including mechanical skills, information technology, mathematical tasks, and scientific tasks (Kizito, 2016).

Technology skills are mostly possessed by individuals who have specialised in specific areas, making them specialists. Research has proven that an individual can possess more than one technology skill, depending on their intelligence. There exists a belief that only smart individuals can possess such skills. According to Martín-Rojas et al. (2016), technology skills can be acquired through learning and mastering of the content in the area of specialisation. Therefore, technology skills are aimed at solving the technical aspect of obtaining solutions. It is undeniable that technology skills can be crucial to both the individual possessing them and the organisation hiring such skills. Firstly, individuals possessing such skills enjoy unlimited benefit in the pool of workers. Enjoying high paying jobs is a prime benefit that accrues from possessing technology skills. This is because advancement in technology will see many people ready to adapt to such changes, hence the demand for such services will escalate, which in turn will enhance the pay for services offered. Besides, technology skills boost the confidence of an individual during provision of services, hence making them work efficiently to provide high quality services (Henriksen, Richardson, & Shack, 2020).

In contrast, technology skills can impose a negative impact on both the individual and an organisation. Job loss is the most common risk to an individual with technology skills, whereas to an organisation it is a change of technology. An individual will be rendered jobless when there is a change or advancement of technology which will require an organisation to employ another individual who is equipped with the skills of operating the technologically advanced machinery. Consequently, an

organisation will be burdened to have extra employees on board, trusting that either the rate of production will remain the same or surpass the existing rate. According to Tae-Kyung (2017), it is required for technologically skilled staff to continue updating their skills whenever advancement in technology is made. Thus, both an individual and the organisation will enjoy the fruits of technology skills.

Understanding the different internal and external complexities and nuances of conducting business in a technologically progressive environment allows enterprises in technology-focused sectors to tap into collaborative resources to build an edge over their competitors (Hsu & Chen, 2019; Martín-Rojas et al., 2016). In 2000, Augustie and Saad (2019) tackled a study that looked at the effect that an organisation's entrepreneurial approach to doing business in the United States had on its ability to perform. This study argued through empirical evidence that these high-technology firms through incessant organisational learning gained and employed a variety of technical skills linked to innovation and different entrepreneurial initiatives (Augustie & Saad, 2019).

Organisations that build and improve on their technological skills (especially middle managers who harness the leadership quality needed to create a culture of delivery) will eventually assist the enterprise to improve its entrepreneurial orientation and promote entrepreneurial activity (Martín-Rojas et al., 2016). This is especially true in high technology startup organisations, as these firms are frequently more malleable than established large corporations in preserving their aptitude to combine their technical know-how with other corresponding assets. Some of these assets include distinctive technological managerial competencies employed in manipulating international expansion prospects to better their technological skills and consequently improve their entrepreneurial orientation (Hsu & Chen, 2019; Patel et al., 2015). The best entrepreneurs in these technological startup organisations identify these expansion prospects through technological assets that need a creative set of technological skills (Baron, Mueller, & Wolfe, 2016).

Organisations that are in industries largely affected by rapid changes in technology go through periods of crises due to unexpected events outside of the firm's internal locus of control (Deshpande, 2018). He argues that organisations go through difficult periods like these, which not only threaten their competitive advantage but also threaten their ability to remain sustainable in the long run. He further argues that this reality is often attributed to the technology startup financier's inability to respond and modify their operational style to the shifting requirements of the firm (Deshpande, 2018).

The research evidence implies that the skill required to use technology efficiently becomes a precondition for the improved innovation in the firm and the technological skills within the firm

become crucial to remain entrepreneurially competitive. Technological skills in organisations like these are particularly important as these skills drive, enable and increase innovation (Du et al., 2016). Due to the change caused by this crisis, the firm must reorient its strategic initiatives, which in high-technology organisations requires the simultaneous development of the technological skills, technological know-how and practices required to grow and develop the organisation competently and meritoriously (Martín-Rojas et al., 2016; Medcof, 2017).

Recent studies performed in advanced materials and information communication and technology industries have revealed the present propensity of high-technology organisations to participate in different forms of invention, namely product process marketing, and organisational innovation is largely influenced by the technological skills of the employees in the entire organisation (Martín-Rojas et al., 2016; Ganzer et al., 2017; Kashmoola, Ahmad, & Kheng, 2017).

For this study the researcher regarded the technological skills present within the enterprise as crucial influencers of entrepreneurship and innovation spearheaded by individuals within the firm to exploit a variety of innovative prospects (Tripopsakul & Charupongsopon, 2017). Hence, the vast majority of startup organisations or high-technology organisations that have carved out a competitive advantage for themselves through incessant innovation have done so through the influence and skillset of a bunch of passionate individuals (Martín-Rojas et al., 2016). Individuals whose technical skills have had a critical function in the enterprise achieving an unassailable share of the markets have led these firms to successful innovations. Research has also shown that these technological skills can never be applied in isolation but should rather follow a complementary path that involves scientific know-how (Scaringella et al., 2017; Ganzer et al., 2017; Medcof, 2017).

3.3.6 Technological will in technological competence literature

Amongst the various desires that ought to be adopted by any organisation, technological will is one of the most essential (Teece, 2018). Other desires include adequate infrastructure, personnel and investment within an organisation. Technological will can be conceptualised from literature as the ability of firms to desire to employ methodical and technical know-how through a determined chain of repetitive tasks and processes to enhance an improved quality of products and services (Ayough et al., 2020; Sturdy & O'Mahoney, 2018; Martín-Rojas et al., 2016). Desires are known to be the force behind the implementation of most crucial decisions and ideas in any organisation. Therefore, it simply implies that adoption and implementation of any decision within an organisation depends entirely on the will of the organisation to move in the anticipated direction. The definition of the term "will" implies that it is something that is being wished for or rather, the urge to have something

accomplished. According to Martín-Rojas et al. (2015), the will of an organisation represents its future, since all desires at a certain point will come to pass.

Technological will is centred on the desire of an organisation to be equipped with the latest technological capabilities to foster its growth (Ayough et al., 2020). Technological will acts as a motivator to an organisation as it wishes for a certain level of technology and by doing so it forces the top management to create a plan for incorporating said technology (Ayough et al., 2020). For instance, a firm that is willing to let go of the old technology of production and embrace new technology must invest more resources (capital) that will see the acquisition of such technology. Research evidence suggests that technological will has enabled many organisations to establish a competitive advantage due to the enhanced quality of products courtesy of the new technology (Cross & Proctor, 2016). Any organisation that lacks technological will is patently waiting to become obsolete, since technology is now becoming the driver of product creation and delivery. Thus, not having a technological desire implies that production activities will continue through old technological methods, resulting in unfavourable outcomes for the firm.

The core benefit of technological will is the push to utilise modern technology in production aimed at ensuring that products and services are of a high standard (Cross & Proctor, 2016). Conversely, the absence of this unique aspect in an organisation will not only kill creativity and innovation but will also lower the competitive advantage in the market due to the inferior quality of products (Cross & Proctor, 2016). As a result, the literature suggests that technological will is a crucial attribute for businesses just starting out.

The desire of an organisation to adopt and fully utilise modern technology is regarded as a way of elevating the organisation to the next level. However, some scholars have argued that technological will is not necessary for startup ventures but only favourable to already developed businesses that have won themselves a significant share in the market (Cross & Proctor, 2016). Ayough et al. (2020) dismisses this view and argues that achieving milestones in complex technological environments is not a function of years in business as the development of technological will within an organisation is driven by the firm's understanding of its mission and vision, its staff and culture, all of which are also present in businesses just starting out.

Additionally, numerous scholars have emphasised the significance of technological will in organisations and especially tech startup organisations. A firm's technological will forms part of its technological competencies since research has proved that the competency of any firm relies on its desire to adopt and utilise technology during production processes (Martín-Rojas et al., 2016).

Technological will acts as a motivator to an organisation as it wishes for a certain level of technology and so it forces the top management to produce a plan for incorporating the required technology. Cross and Proctor (2016) argue that organisations with high levels of technologies incorporate the technological will which will see the organisation adopt modern technology whenever technology innovation is achieved by scientists. Consequently, research has proved that 'technological will' has made it possible for many organisations to have an advantageous position because of their enhanced quality of products courtesy of improved technology (Cross & Proctor, 2016).

The research evidence seems to imply that the will of the tech startup to improve its technological capabilities, especially at the production level and service delivery, will definitely enhance the firm's attitude towards being entrepreneurial, which in turn could enhance its performance objectives. Technology is regarded as critical at the startup of every organisation, hence the need to ensure that the desire to upgrade technology is alive (Deshpande, 2018). The research evidence seems to imply that it is through the technological will of an organisation that technology competency can be partly achieved as a way of fostering entrepreneurial activity and innovation for the performance development of startups, a gap in knowledge this study sought to fill.

3.3.7 Technological knowledge in technological competence literature

Technology can be appealing to an organisation when an expert is employed to run and operate machines. According to Alkhaffaf (2018), technology becomes interesting and advantageous to organisations when employees have the necessary knowledge regarding the tools, products, processes and machines.

The term technology knowledge is directly related to how well an individual understands a specific machine that is used in the production process (Galeazzo & Furlan, 2019). Employees of any organisation are the target group of whether they are equipped with technology knowledge as demanded by their employers. On the other hand, organisations and employers use technology knowledge as a criterion to hire staff. According to Galeazzo and Furlan (2019), employees with sufficient technology knowledge are better placed in the employment selection process. Besides, those with limited technology knowledge are termed to be incompetent in the operation of machines. Organisations have a belief that technology knowledge should be theoretical, hence locking out those who fail to verbally express their technology knowledge.

From the existing research, many scholars believe that technology knowledge at times cannot be used in the grouping of employees as either competent or incompetent. According to their argument, one can possess the basic technology knowledge by the practical operation of machines (Galeazzo &

Furlan, 2019). For instance, employees with practical knowledge of machines are far better placed compared to employees possessing basic theoretical technology knowledge. Therefore, it is recommended that employers who want to ascertain technology knowledge of their employees should produce a platform where both the theory and practical part are tested before deciding on the perfect employee. Possessing technology knowledge, however, is both advantageous to the staff and the organisation at large. The technology knowledge of an employee implies that production rate as well as the quality of the products are enhanced (Galeazzo & Furlan, 2019). As a result, the employee will attract a desirable salary for the services provided. In contrast, technology knowledge may scare away some employers from hiring an individual, cognisant of the demands that will accompany the services of a specialist (Galeazzo & Furlan, 2019; Alkhaffaf, 2018). In summary, technology knowledge should be termed the most critical qualification of any employee when dealing with technology matters.

Technological competence has technology knowledge as one of its main components. The relationship that exists between technological competencies and technology knowledge can be one of the most essential relationships required to conquer the world of technologies (Alkhaffaf, 2018). Thus, technology can be attractive to an organisation when a person with technology know-how is positioned in departments in the tech startup where his knowledge is most needed (Alkhaffaf, 2018). Technology knowledge can be described as the expertise an individual possesses that makes him/her confident and comfortable when solving complex business challenges. Also, the term technology knowledge is causally related to how well an individual understands a specific tool used in the product development process of new products and services in a tech startup (Galeazzo & Furlan, 2019).

According to Galeazzo and Furlan (2019), technology knowledge is most needed by organisations' staff to comfortably and appropriately handle tools and equipment specific to that firm. However, the argument still faces some opposition from other scholars who believe that technology knowledge never plays such an essential part in technological competency of an organisation because skills are more important in today's complex business environments (Cross & Proctor, 2016). This argument becomes very hard to support in the current world we live in where technology keeps changing and new knowledge is being obtained by competitors almost on a daily basis (Galeazzo & Furlan, 2019). Besides, existence of technology knowledge within an organisation is not solely about building new products and services but it also implicitly helps the tech startup attract better talent (Ganzer et al., 2017). This suggests that tech startups who possess superior technological knowledge and position themselves as thought-leaders in the industry are more likely to attract top talent to the firm. Top talent Galeazzo and Furlan (2019) argue is known to drive the overall performance of the startup.

Consequently, in the present world, many organisations are using the technology knowledge gap to thrive in the market. Such organisations employ technology knowledge on latest technologies to help them win a significant market share. Since many organisations neglect educating their staff on the latest technology, the few that ensure their staff are well equipped with technology knowledge often grow at a faster rate than their competitors (Deshpande, 2018). The technology knowledge also helps organisations analyse the various factors that can affect them both internally and externally (Deshpande, 2018). This is how an organisation can plan effectively to uphold its strengths and ensure that weaknesses are appropriately dealt with to avoid a negative impact.

According to the study conducted by Alkhaffaf (2018), innovation in any organisation is first based on the technological knowledge of the employees. Organisations that focus more on the technological knowledge of both the employees and management staff are always ahead of other organisations. Besides, startup organisations that appreciate and utilise technological knowledge and achieve technological competence are more reliable and stable than even the old organisations that already exist in the market (Teece, 2014; Teece, 2018). For entrepreneurs to be successful in the current competitive market, they must employ all the available resources, including technology knowledge. Having the necessary knowledge will see appropriate utilisation of the available resources with the aim of increased production (Galeazzo & Furlan, 2019).

Technology knowledge within an organisation with full support of the top management enables the creation of favourable entrepreneurial conditions and mindsets critical in discovering and exploiting innovative opportunities (Alkhaffaf, 2018; Galeazzo & Furlan, 2019). This provides proof that for any startup technology knowledge plays a vital role in achieving the required technological competencies. Possessing technology knowledge is regarded as advantageous to both the staff and the organisation, therefore, it is not farfetched to suggest that technology knowledge is capable of enhancing innovation in an organisation.

Complex business problems can easily be countered by employees with vast experience and knowledge of technology. Thus, when a technological issue arises, an organisation should ensure it is handled by employees with the appropriate technological knowledge.

In summary, research evidence suggests that technological knowledge can create an ideal entrepreneurial environment where innovation can thrive for tech startups to compete favourably. Furthermore, the addition of technological knowledge as part of comprehensive dynamic capabilities-based model of technological competence in enhancing the effect of entrepreneurship and innovation

on performance has had no discussion to date and may prove effective for the performance aspiration of tech startups on the African continent. This study sought to fill that gap in knowledge.

3.4 CONCLUSION

In summary, technology has an essential role in startup ventures. Going by the research in the last decade, there have been remarkable increases in technologically based startups which have tried to launch new products to compete with the already existing ventures. The review in this chapter suggested that organisations that utilise technology appropriately have been markedly successful. Furthermore, the review highlighted that technology can only be beneficial to both the staff and organisation when appropriately utilised. To adopt technological operations, organisations must ensure that they meet the three primary requirements of the staff: technology skills; technological will; and technology knowledge. These requirements will dictate the level of preparedness of any organisation in utilising modern technology. Technology skills will entail the abilities possessed by an employee regarding the use of technology. Technological will suggests that an organisation has the desire to change their production processes to technologically based production while technology knowledge is used in the study to highlight an employee's expertise and technology know-how. Possessing such requirements will enable tech startups to utilise technology comfortably and confidently.

The chapter revealed that distinct technological competencies are paramount for firms looking to accomplish a sustained competitive prowess in their respective sectors or industries by adjusting rapidly to shifting prospects. The distinctive competencies entail both tangible and intangible resources that give any organisation a competitive advantage. Thus technology-based ventures find it easier to penetrate and win novel market shares. The literature review implied that technologically distinctive competencies are also featured in the innovativeness of an organisation.

However, even though the research strongly suggests that developing a startup's technological competence may lead to improved performance, its effect on strengthening the impact of entrepreneurial orientation and innovation capabilities as intervening measures of performance development has not been established. The review implied that without this view, the ability to comprehensively provide answers about reasons why many startups fail has been described as futile and a complete waste of time. Therefore, technologically distinctive competencies in digital technology organisations have been described as the facilitator of this phenomenon, thus the inclusion of technological competence as part of a comprehensive capabilities-based model for the performance of tech startups.

3.5 ORIENTATION TO THE NEXT CHAPTER

Chapter Four focuses on a review of the literature surrounding organisational learning as a driver and discusses arguments put forward by researchers looking at organisational learning capabilities in tech startup literature.

CHAPTER 4 :

LITERATURE REVIEW: ORGANISATIONAL LEARNING AS A DRIVER

4.1 ORIENTATION TO THE CHAPTER

In this chapter a review of the latest thinking in organisational learning capabilities literature and how these have evolved in high-tech industries, is analysed and discussed. Insights and conclusions drawn from the literature review process are discussed and an orientation to the following chapter is shared at end of this chapter.

4.2 INTRODUCTION

In the organisational context of conducting business, organisational learning is a precursor for the expansion of an entrepreneurial mind-set, a culture of innovation and skills in processes of production, marketing and organisational innovation (Brandes Institute, 2017; Clark, 2018; Romano & Zabala-Iturriagagoitia, 2020).

According to Brandes Institute (2017), the expansion of an entrepreneur's entrepreneurial mind-set is based on the acceptance of learning. Regarding the organisational structure, learning designs should be entirely based on learning theories that are essential in providing a basis for how different staff members learn and their ability to predict the outcome of the learning process. Accordingly, learning theories enable an organisation to make appropriate decisions on the design, development and delivery of learning (Gachanja et al., 2020; Surdu & Narula, 2020). This implies that the product innovation, marketing, and organisational innovation depend on the understanding and implementation of the knowledge shared in learning theories. Besides, learning theories can be grouped based on the platform on which they are employed (Clark, 2018). For instance, when dealing with entrepreneurship, there exist theories that best explain the entrepreneurship aspect. Learning theories can also be understood through the lens of understanding the role they play in the innovation process.

Consequently, dealing with startup organisations, entrepreneurs need to take an interest in organisational learning since this helps them gain know-how on how best to run knowledge-intensive organisations and survive competitive environments found in both developing and developed markets (Clark, 2018; Gachanja et al., 2020; Surdu & Narula, 2020). A description of organisational learning, learning theories in entrepreneurship, and learning theories in innovation is provided next.

4.2.1 Traditional approaches to organisational learning as a driver

A firm's learning capability can be described as its ability to never remain limited to its existing methods and approaches to tackling complex business problems. A firm's ability to learn involves a process of acquiring new knowledge and ways of operating in environments that are ever changing and dynamic (Alvarez-Torres et al., 2019). Individuals in firms that possess this capability are required to cope, gain and absorb new ideas and unlearn old things in a way that ensures the business benefits as a whole (Gachanja et al., 2020). Therefore, organisations must embrace learning through subjecting their staff to workshops and activities aimed at educating them and upskilling them about the changes in the industry because of technological advancements (Alvarez-Torres et al., 2019). Workshops and training programmes, some researchers argue, can enhance the organisation's ability to foster a culture of learning and reduce its chances of making the same mistakes multiple times over (Mendi & Costamagna, 2017).

Digital technology startups nowadays have their organisational success very intricately linked to their ability to gain new knowledge in various dimensions but research suggests that traditionally this has not always been so (Ganzer et al., 2017). In a study that investigated a firms' innovation capabilities, researchers highlighted the importance of the individuals in such organisations exhibiting a desire to learn but could not fully explain why some failed and others succeeded (Alvarez-Torres et al., 2019). It undoubtedly implied that learning is important for the success of some firms, provided it is implemented appropriately, under close watch of qualified staff and in business environments that value a culture of learning and are technologically equipped to deliver on it (Gachanja et al., 2020). Research evidence suggests that the only way to win a greater share in the market is to ensure that staff are equipped with sufficient knowledge and skills to comfortably and repeatedly work with modern technology to produce quality products that satisfy the needs of customers. Failure of businesses surveyed in Europe and the USA to implement such measures resulted in creation and delivery of substandard products which ultimately did not meet market standards and affected the organisation negatively (Paradkar et al., 2015).

Paradkar et al. (2015), in a study of innovation in startups, showed that firms with a culture of learning that operated in an environment conducive for high levels of entrepreneurship moved from the ideation phase to improved technology-based solutions quite rapidly. Lau and Lo (2019) and Surdu and Narula (2020) have studied a firm's learning capabilities and its effect on its ability to internationalise and subsequently succeed in foreign markets. What they emphasised is that an organisation's ability to be supported by various external forces such as partners and funders, was a contributing factor to its ability to succeed.

The research evidence seems to suggest that a comprehensive, dynamic capabilities-based approach to learning that takes into account aspects of the culture with the tech startup and the firm's attitude and ability to take the time out to imbibe knowledge may affect its ability to succeed. A review of dynamic capabilities-based approaches to learning is discussed below.

4.2.2 Organisational learning theory in tech startup literature

For innovation to increase in all spheres of the organisation, entrepreneurs in startups must dedicate a disciplined amount of time towards their organisational learning capabilities (Romano & Zabala-Iturriagagoitia, 2020). Startup enterprises require a variety of skills and technical capabilities to foster learning at various stages throughout the long-term expansion strategy of the firm. Thus, entrepreneurs in these firms must constantly nurture their desire for knowledge to increase their ability to innovate throughout the organisation. Being able to gain superior new knowledge is a prerequisite for increased innovation in the firm but is under researched (Mandal & Bagchi, 2016; Martín-Rojas et al., 2016).

The concept of organisational learning, in relation to developing and building the entrepreneurial orientation of the firm, is crucial and underdeveloped. Creating a culture in an organisation where the individuals that work there constantly beg for new knowledge makes the development of an entrepreneurial climate more probable and such ingenuities institute one of the primary methods to foster technological advancements and fast-track maintainable progress (Clark, 2018; Romano & Zabala-Iturriagagoitia, 2020).

The entrepreneurial orientation of technology organisations is better developed and encouraged when the enterprise has successfully and unsuccessfully spent significant amounts of time on funding its organisational learning strategy (Martín-Rojas et al., 2016; Mandal & Bagchi, 2016; Brandes Institute, 2017; Medcof, 2017; Mehta & Talwar, 2019; Romano & Zabala-Iturriagagoitia, 2020). It Is vital to understand that in the context of digital technology or tech startups organisational learning initiatives, success and failure are encouraged because successful initiatives are repeated by teams involved and failed initiatives are revamped or abandoned (Clark, 2018; Romano & Zabala-Iturriagagoitia, 2020). Likewise, several researchers in the field of organisational learning place significant emphasis on the fact that organisational learning has become an extremely important element for economic empowerment and social development, specifically the development of a culture of proactiveness in complex business environments (Clark, 2018; Romano & Zabala-Iturriagagoitia, 2020).

Researchers have emphasised that the development of organisational learning within technology startups may mentally inspire employees to be more aggressive, autonomous and creative by exploiting previously untapped opportunities (Mehta & Talwar, 2019; Matin-Rojas et al., 2016). This implies that if organisations are looking to grow and increase their entrepreneurial orientation and innovation capabilities, they need to discover these opportunities and take advantage of them in a lucrative manner. In addition, novel organisational learning capabilities will be paramount for organisations looking not only to identify these prospects but also to effectively exploit them (Mehta & Talwar, 2019; Martín-Rojas et al., 2016). Being able to develop this knowledge and learning capability is precisely what distinguishes these entrepreneurs in digital technology startup enterprises from the competition (Shaher & Ali, 2020). Their ability to effectively do so will have a significant effect on their ability to remain sustainable in the long run and competitive in the short term (Shaher & Ali, 2020). All these factors are important to consider for digital technology startups as these may in turn be related to improved organisational performance. Entrepreneurs with more knowledge and greater self-efficacy, gained through robust and well-structured organisational learning activities, will be more confident about their efficiency and will learn from organisational technical complexities in the market and be much faster in identifying these challenges (Mandal & Bagchi, 2016; Shaher & Ali, 2020).

The studies above form the basis of this study's hypothesis that a startup's organisational learning capabilities may have a positive influence on strengthening the impact of its entrepreneurial orientation on its ability to perform, in the African context.

By improving technical know-how, origins and prospects acquired through strategic initiatives that involve extensive learning, entrepreneurs can continuously develop additional significance (Clark, 2018; Romano & Zabala-Iturriagagoitia, 2020). As soon as these enterprises can gain this knowledge, it could easily be acknowledged as a method by which the previously disorganised organisation may become more organised. Companies that foster and encourage their organisational learning initiatives typically experience the ability of this phenomenon to enable the growth of technological variables throughout the enterprise as a synchronising supervision process that allows for continued and sustained innovations (Clark, 2018; Mehta & Talwar, 2019; Romano & Zabala-Iturriagagoitia, 2020).

This was evident in a study conducted in the nanotechnology industry where the researchers looked at organisational learning as a communications, supervision and regulation enabler to enhance the innovation process (Scaringella et al., 2017). In this fashion, the enterprise may then become the intellectual unit, where new capabilities, aptitudes and comprehension grow and are fostered (Clark, 2018; Romano & Zabala-Iturriagagoitia, 2020; Mandal & Bagchi, 2016). Many researchers studying organisational learning and innovation have described organisational learning as the vehicle in a firm

that constitutes the defining factor in the creation of a competitive edge in the market through incessant innovation. In a study conducted in the information and communications technology (ICT) sector, researchers showed evidence of enterprises that fostered their technological know-how, expanded their market share, and developed a crucial possibility for obtaining the outcomes associated with a firm's innovation capabilities, namely product, process, marketing and organisational innovation (Martín-Rojas et al., 2016; Mehta & Talwar, 2019). Further research is needed for an amalgamated model that encompasses a firm's organisational learning capabilities as a means of improving the innovation process in startups and subsequently their ability to compete internationally (Martin de Castro, Delgado Verde, Navas López, 2013; Urban, 2017; Teece, 2018; Surdu & Narula, 2020).

4.2.3 Organisational learning theory in entrepreneurial orientation literature

An organisation's life is always attributed to a continuous learning process regarding the aspect of entrepreneurship. Over the years, scholars have tried to analyse and develop models that account for how entrepreneurs learn but a substantial amount of that empirical research is underdeveloped (Gachanja et al., 2020). A growing and enhanced theoretical gap of learning aimed at entrepreneurship continues to be vital (Nambisan, 2017). According to Schmitt, Rosing, Zhang, and Leatherbee (2017), learning theory is the foundation of entrepreneurship theories but its true effect on performance in combination with other possible drivers of entrepreneurship is still unclear. Most assumptions are drawn from extant theory in learning and educational science and how it informs scholars' quest for knowledge on learning. In trying to examine the extent to which learning theory has been applied both implicitly and explicitly in entrepreneurial literature, gaps in literature have been identified.

As a simple definition, learning in entrepreneurship literature refers to the process in which knowledge and experience are acquired while aiming at the growth of various ventures that entrepreneurs may find attractive (Nambisan, 2017).

Dynamic capabilities-based approaches to learning consist of humanist, cognitivist, social constructivist, behaviourist, and social cognitivist elements (Audet & Marcotte, 2018). These elements have been evoked in learning theory in entrepreneurship research and form a core part of the approach to learning employed in this study. Learning plays a fundamental role in transforming post-industrial societies and economies into innovation societies (Audet & Marcotte, 2018). The definition of learning has gained variation depending on learning paradigms being anchored. Nonetheless, the definitions are not restricted to positive outcomes since they remind us that learning is not always good: a person can also learn techniques in startups detrimental to success (Gachanja et al., 2020). A contemporary perspective on learning views it as a collective of cognitive, emotional and

environmental influences and how they change one's knowledge, skills and environmental views (Nambisan, 2017; Audet & Marcotte, 2018).

Learning theories refer to explanations of what happens during the learning process. Numerous theoretical approaches are directed towards the understanding of the nature of learning. But in entrepreneurial literature they are often categorised into two: stimulus-response theories and cognitive theories.

According to Steffens (2015), learning theories can be understood by understanding the dominance of their trait. In the analysis of the behaviourist approach in relation to entrepreneurship, the focus is on the importance and imposition of particular routines and behaviours. Behaviourism has a major influence on the view of knowledge as a form of expressed objectives (Steffens, 2015). Scholars recommend the use of outside sources by entrepreneurs to help them in offering advice and persuasion to acquire innovative skills and more extensive information that could be more necessary for success development (Fust, Wustrow & Fueglistaller, 2017). Still in the same review, Fust et al. (2017) assert that recommendations of behavioural objectives are essential in entrepreneurship training. This implies that the behaviourist approach in understanding entrepreneurship and learning is evident in the extent to which the researcher tries to analyse the repertoires of behaviours and attitudes individuals who work in startups possess, and how essential these are in building a culture of proactive business venturing.

In the cognitive approach, emphasis is placed on the individual's ability to plan and solve problems, on reflection, and on abilities to reason with the help of their prior knowledge, motivation, and mental structures (Fust et al., 2017). Cognitivist learning is realised by the entrepreneurs' ability to reorganise experiences and make impactful decisions based on the input from the environment. According to social learning theory regarding entrepreneurship, the centre stage becomes the extent to which individuals are triggered to venture into unfamiliar business territory as a result of on-the-job learning (Nambisan, 2017). As much as self-efficacy has proved to be an important antecedent in entrepreneurial behaviour, the reflection of social learning in entrepreneurship has become more debated, especially during innovation and the context of entrepreneurship education in recent years (Narula, Asmussen, Chi, & Kundu, 2019; Surdu & Narula, 2020). Entrepreneurship education has been proven to have measurable impact in perceived behavioural control (Nambisan, 2017).

Additionally, an entrepreneurial network is another theme which results from social learning in entrepreneurship. Entrepreneurs use their networks to learn and discover new ideas, develop revenues and increase their motivation (Fust et al., 2017). In line with the social learning theory,

entrepreneurship mentoring programs are used to raise career entry expectations and encourage confidence in the personal abilities which are equally important for successful venture creation and business management (Zhang, Wei, Sun, & Tung, 2019).

However, as much as the existing literature places significant emphasis on specific preoccupation with entrepreneurial networks, more empirical work ought to be based on the identification of distinctive forms of learning that are a result of the relationship an entrepreneur engages in, whether within or outside the business (Steffens, 2015).

Besides the humanist approach, learning has also contributed to behavioural outcomes in entrepreneurship. This implies that experience is the basis of an entrepreneur's ability to disseminate new learning techniques to the rest of their team members in a startup in lower positions in the organisation. According to Audet and Marcotte (2018), the value of learning is through failures and entrepreneurs acquire sufficient knowledge about the past experiences of other entrepreneurs and from there discover appropriate choices which can promise success but research into this is underdeveloped (Audet & Marcotte, 2018). Entrepreneurship research calls for the incorporation of an experiential component into entrepreneurship education and training programs (Audet & Marcotte, 2018). Nonetheless, recognition of cognition and emotion also play a pivotal role in entrepreneurial learning. Emotions should be managed from failure since failure calls for the need to move beyond the cognitive dimension of entrepreneurship.

Lastly, the constructivist approach to learning has also been studied in entrepreneurship research. The core of constructivist learning, according to Martín-Rojas et al. (2016), is the entrepreneur's ability to have relational qualities of entrepreneurial learning and how these can be examined by exploring their existence, for example, in the startup funding process. This theory has roots in Mezirow's theory of transformative learning in entrepreneurship research (Zhang et al., 2019). In this study, the literature review draws more attention to the social learning theory paradigm. It appears to be the perspective with most entrepreneurship research. A great deal of emphasis has been placed on the self-efficacy of the entrepreneur; however, research still needs to uncover more in the areas to do with various learning techniques and network use as means of fostering startup performance (Martín-Rojas et al., 2015; Teece at el., 2018). In addition to social learning, the cognitive aspect has also highlighted major concerns in entrepreneurship learning. This is evident in the application of ideas and concepts from cognitive approaches which have been proven useful in entrepreneurship research (Surdu & Narula, 2020).

As demonstrated in this chapter, learning as a concept in entrepreneurship comes in many shapes and sizes and therefore scholars are yet to converge upon a dominant theoretical paradigm for learning as a means of fostering an entrepreneurial mindset needed to boost startup competitiveness. Critical entrepreneurship learning requires knowledge and know-how that is specific to entrepreneurship (Gachanja et al., 2020). In line with critical thinking pedagogy, the applications of the theoretical aspects of learning in relation to entrepreneurship are proposed for the purpose of achieving a multi-dimensional view for startup performance in African tech spaces.

4.2.4 Organisational learning theory in innovation literature

Many researchers agree that learning and innovation are key areas that determine the success of any business enterprise (Narula et al., 2019; Olufunke, 2020). Learning is a necessity for innovation; therefore, innovation cannot occur without the learning process being put into action through creativity (Lau & Lo, 2015). For any organisation to innovate, the organisation's leadership should not only embrace innovation but also put it into full practical operation (Olufunke, 2020). Other researchers strongly disagree and argue that the wrong things can also by systematically learnt and negatively impact innovation just as 'efficiently' if not more so, looking at the poor tech startup performance figures (Gachanja et al., 2020). The research evidence thus implies that the primary goal of any tech startup should not only be to constantly innovate, but also to find a combination of capabilities – which should intimately involve the culture of learning the right things in the right way – to foster innovation and consequently performance.

In this study, the activity model of learning was analysed to examine the extent to which learning activities are used by entrepreneurs to respond to contradictory circumstances during innovation orientation (Lau & Lo, 2015; Narula et al., 2019).

Activity theory

Activity theory argues that human activity is object-oriented; therefore, whether the individual or organisation with innovative ideas acts as per the goals as a result of the intrinsic motivation aimed at transforming the present situation, it finally provides an end product (García-García et al., 2017). The relations of both the subject and object are interceded by either psychological or technical tools (García-García, García-Canal, & Guillén, 2017). In an organisational context, an activity is aimed at satisfying needs of the collective goal. Hence, activity theory succeeds by connecting an individual's world and society, by incorporating further contextual factors. The theory also unravels the relationship between cognitive and material aspects of innovation while focusing on the holistic

dynamics of activities considered essential for confronting the knowledge gap between the cognitive and material world (García-García et al., 2017; Gachanja et al., 2020).

According to Carvalho and Goodyear (2018), innovation and technology are linked as a unit design which is brought to an imbalance resulting in paradoxes in the activity systems. As much as innovation and learning are sometimes contradictory, identifying the contradictions in the innovative systems through the implementation of separate units becomes the turning point of the whole learning process (García-García et al., 2017; Gachanja et al., 2020). Technological transformations are major remedies for pedagogical innovations that link learning and technology in an organisational setting. Learning transformation thus becomes crucial for the organisation's development (García-García et al., 2017).

Connectivism as a learning theory in innovation

According to Kizito (2016), connectivism in innovation literature can be described as anything that can alter our way of thinking about 'how' and 'why' the dynamic change in the existing entrepreneurial setting towards innovation is an objective approach. Connectivism characterises its exponents as networks of knowledge acquisition which draw on different arguments from learning, and management of knowledge associated with transformative likelihoods offered by emerging trends. On the other hand, Carvalho and Goodyear (2018) view connectivism as a level of learning rather than the theory itself. This is due to its contribution to the development of new pedagogies in innovation in which the control shifts from the educators to the learners.

Social cognitive model

Like entrepreneurship, the social cognitive model's view on innovation is that self-efficacy, role ambiguity and role conflicts are the major antecedents that affect innovative performance (Kabiri, Shadmanfaat, Smith, & Cochran, 2020). The justifications and rationale for this model are drawn from one's anticipation of the benefits that come from innovation development which may not necessarily be aimed at motivating a working behaviour directed towards an innovative practice. According to Narayan and Volberda (2017), if employees possess a stronger intrinsic motivation towards learning, there is a greater possibility that they would be more open to accepting and putting into practice the learning techniques acquired as a means of facilitating their innovation performance. This can be realised if situations and the issue of problem solving can be proactively attended to by managers in an amicable way that fosters a culture of transparency and ultimately proactiveness in the innovation process (Lau & Lo, 2019; Gachanja et al., 2020). This approach further implies that self-efficacy in the innovation process provides recommendable feedback in the realisation of innovative performance

because it is an intrinsic factor that influences each decision-making process undertaken by employees. Those who possess stronger self-efficacy initiate innovative decision-making processes and actively take part in the activities of the organisation, which enhances its innovative performance.

Additionally, an individual's self-reflective capabilities and their willingness to carry out innovation development often results in greater performance levels (Kabiri et al., 2020). Besides, self-evaluation is another concept whose feedback plays an important role in social cognitive theory (Narayan & Volberda, 2017). In this argument, the researcher suggests that innovation outcomes expectations are a phenomenon triggered by a particular set of drivers including the firm's organisational learning capabilities. Expectations driven by organisational learning and self-evaluation outcomes in most scenarios tend to be effective in comparison to employee-based expectations on social and material outcomes. The research evidence showed that a positive relationship existed between customer knowledge development, which forms part of organisational learning, and innovation performance (Kabiri et al., 2020). Time and technological infrastructure still remain an important factor in learning development, because knowledge development as part of learning calls for behavioural modification, which is only possible in firms technically capable of deliberately taking the time to internalise new ways of doing old things (Kabiri et al., 2020).

4.2.5 Organisational learning theory in developed vs non developed markets

Organisational learning as an organisational theory is believed to be significant in the managerial field of planning and operations of any startup organisation, especially those in more developed markets (Surdu & Narula, 2020). This is made evident in the literature review discussed in the sections above. Although the approach cannot necessarily be appropriate in every situation of an organisation, in every given context as was evident in studies in developing markets that looked at the effect of organisational learning on startup internationalisation, learning had a statistically significant effect on internationalisation and growth, either positively or negatively, depending on the environment and context (Martín-Rojas et al., 2016; García-García et al., 2017; Gachanja et al., 2020).

Therefore, these disparate and often contradictory results contribute towards exposing the limitations of existing theory on organisational learning. The literature reviewed in this chapter has proved the presence of some limitations and gaps in the theory that are dependent on context, startup experience and environment readiness when pitted against the operational success of an organisation. According to Medcof (2017), there are three major limitations to successful implementation of organisational learning: unsatisfactory incentives; unclear and unmeasurable goals due to inferior technological infrastructure; and uncertainty regarding the most effective processes.

To start with, organisational learning theory does not consider the motivation of employees in an organisation which is a factor of things both internal and external to the firm (Mehta & Talway, 2019). They argue that organisations should motivate their employees through the provision of incentives, work-life balance support and other wellness schemes which will encourage them to confidently capture and share knowledge with others. Besides, organisational learning possesses an extreme uncertainty regarding the organisational processes aimed at achieving the set mission and vision, which are typically not well formulated in tech startups (Ganzer et al., 2017). Some knowledge, especially that gained through organisation learning, tend not to be essential in running organisational processes in complex dynamic settings, hence limiting the effectiveness of the existing learning theory in some developing markets as opposed to more developed markets (Mandal & Bagchi, 2016). Additionally, unclear and unmeasurable goals of organisational learning in developing markets – usually a function of a lack technological infrastructure to measure, track and provide insights into the most vital aspects of the business that need to change or be fostered – make it hard for employees to succeed in their places of work. This as a result amplifies the uncertainty regarding whether learning improves or hampers a tech startup's ability to succeed in developing contexts versus more developed contexts (Surdu & Narula, 2020). Therefore, organisational learning theory must ensure that these predicaments are addressed for the theory to have a full backing from other scholars. Lastly, the three limitations imply that organisational learning theory faces some opposition which is evident in organisations in developing markets where founders do not often implement new learning techniques with their members of staff because they sometimes simply do not have the time (Mandal & Bagchi, 2016; Gachanja et al., 2020).

As a result of this rigorous literature review, this study sought to provide an answer to the research question using a hypothesis which, if written as a question, would read: Would there be any effect on the entrepreneurial orientation and innovation capabilities of tech startups who developed their organisational learning capabilities as a way of strengthening their combined impact on performance in African tech startups?

This study though recognising the conflicting theories of learning in both developed and developing contexts, hypothesised that organisational learning may have a positive effect on strengthening the combined impact of both entrepreneurial orientation and innovation capabilities on organisational performance in African tech startups. The overwhelming literature on the potential effects of learning on improving tech startup performance globally seemed to suggest this view as appropriate.

4.3 CONCLUSION

In conclusion, startup organisations have their organisational success closely linked to their ability to innovate in various dimensions. Aside from that, learning theory has been closely examined and its contributions towards organisational innovation and entrepreneurial expansion thoroughly interrogated. The technological know-how and the acquired skills of the employees within an organisation are acquired through their willingness to learn and initiate the process. The literature review in this chapter seemed to suggest that for startups to develop, skills and technological know-how on learning are vital as the founders initiate this process and encourage the absorption of new external knowledge. The concept of organisational learning in relation to developing and building an entrepreneurial mindset within a firm has been mentioned by many scholars through various theories but never empirically established. The research evidence also strongly suggested that organisational learning has proven to provide mental inspiration for employees since it enables them to be more aggressive.

It is against this backdrop that this study hypothesised the inclusion of organisational learning as part of a comprehensive capabilities-based approach to performance development. Also, the above view formed the basis of the study, hypothesising that learning theories may influence the risk-taking, proactiveness and innovation capabilities of tech startups in the attainment of improved performance. The research evidence suggests that a rise in technology-based organisations is made possible by strategic initiatives that involve extensive learning. Most organisations have become more organised through learning of roles and technology-based efficiency.

Theories of learning in entrepreneurship and innovation incorporate the personal need to learn and be goal oriented. Learning within this theory depends on the need to gain a certain outcome from the process. It advocates for the empirical evidence of the end product of a learning process, which it implies is organisational performance.

Furthermore, the theories call for recognition of cognition and emotions which determine the willingness to learn and apply that learning in the field. Social learning theory has been proven to be the paradigm with the most entrepreneurial integration whose ideas and concerns have gained currency in entrepreneurial innovation.

The learning hypothesis put forward in this study as part of a comprehensive capabilities-based model for performance development is useful in understanding current knowledge gaps and may help provide useful insights into relationships currently empirically lacking in existing literature.

4.4 ORIENTATION TO THE NEXT CHAPTER

Chapter Four focuses on a review of the literature surrounding organisational learning as a driver and discusses arguments put forward by researchers looking at organisational learning capabilities in tech startup literature.

CHAPTER 5 :

LITERATURE REVIEW: INNOVATION, ENTREPRENEURSHIP AND PERFORMANCE

5.1 ORIENTATION TO THE CHAPTER

In this chapter a review of the latest perspectives on innovation, entrepreneurship, and organisational performance in tech startup literature and how these have evolved in high-tech industries is analysed and discussed. The conceptual framework used in this study is discussed in section 5.7 below and the consequent hypothesized model developed to answer the research question is discussed in section 5.8 below. Insights and conclusions drawn from the literature review process are also discussed as a way of ratifying the hypothesized model used in this study. Finally, an orientation to the next chapter is shared at end of this chapter.

5.2 INTRODUCTION

Literature in the field of high-tech businesses suggests that innovation capabilities and entrepreneurial orientation are part of a comprehensive model for innovation management. This view was taken from various literary studies, most of which looked at the mental motivations of individuals working in high-tech environments and their ability to effectively disseminate technology across the organisation (Kassema, 2020; Mendi & Costamagna, 2017). For improved performance to take place, internal resources should be discovered through a series of processes within an organisational setting (Kassema, 2020; Becker & Zirpoli, 2017). Drivers are needed for firms to take on more risk and participate in more innovative activities for change to take place (Becker & Zirpoli, 2017; Mendi & Costamagna, 2017), and the success of a tech startup's approach depends on various aspects, including culture, structure, and governance (Kassema, 2020; Becker & Zirpoli, 2017).

In this chapter a review of the latest perspectives on innovation, entrepreneurship, and organisational performance in tech startup literature is presented. The aim was to investigate whether there exists a real benefit for the performance of tech startups that comprehensively integrate different styles of innovation with an entrepreneurial orientation. To date, this has had very little discussion globally and almost no discussion for tech startups on the African continent.

5.3 INNOVATION AS A DRIVER

Innovation refers to the introduction of something new, which could be an idea or process or product (Şehbenderoğlu, 2019). Adoption refers to when individuals incorporate an innovation that is newly initiated into their entrepreneurial activities, while diffusion refers to the collective adoption process

over a period. The adoption-diffusion theory therefore refers to the process that involves the spread of an idea within a given period. The innovation-diffusion theory introduced by Edward Rodgers has been used as a point of reference in several case analyses since it provides a useful foundation for understanding the process of innovation and the factors that determine decisions about adopting innovative ideas (Şehbenderoğlu, 2019). This model is complex and has been proven difficult to use in startup performance literature, especially when planning for organisational change that involves adoption of innovation as way to boost performance, as it focuses solely on a firm's ability to adopt an innovation within a given period as the key driver of its ability to outperform its competitors (Rochman & Peiper, 2017). Though this was the case for Mackenzie (2017), Grush (2016) found that the adoption-diffusion theory could not conclusively provide answers to questions raised around tech startup performance since the technology available to startups seemed to have a greater effect on their ability to perform.

As a result, with a view to expound on a comprehensive capabilities-based approach to innovation, some scholars have argued that innovation as a driver of performance goes beyond just the adoption process (Mackenzie, 2017; Şehbenderoğlu, 2019). They identified a number of aspects of the innovation process that determine whether a specific innovation is adopted or not. These include its compatibility with the current process, its complexity, and the relative advantage to the general outcome (Mackenzie, 2017). The results of the study showed that there were considerably better productivity and creativity results for tech startups that employed three components of the innovation process than those that adopted the more traditional approaches of just one measure, but they could not conclusively account for the prevalent inconsistencies in performance results.

Mackensie (2017) argued that innovation goes beyond the adoption process and that innovation possesses attributes that determine whether the innovation is adopted or not, its compatibility with the current process, its complexity, and the relative advantage to the general outcome. If an innovation is perceived to be too complex or perceived to be irrelevant to the tech startup's specific context at the adoption stage, it is likely to be less compatible with attributes they need to foster performance (Peiper, 2017). The management of innovation in its various forms as a result becomes crucial to tech startups looking to foster change and remain competitive.

5.3.1 Traditional approaches to innovation

Innovation as a phenomenon has undoubtedly played an integral role in building and growing new ventures to gain new market share, increase revenue and drive long-term success in different industries across the globe (Azar & Ciabuschi, 2017; Teece, 2018). The innovation capability of a startup venture is one the crucial elements of internal firm capabilities, since its primary function is to

determine the kind of innovation required, when it is required, and, in some cases, where it is required to help novice firms grow (Ganzer et al., 2017). Therefore, a common approach can easily be adopted by a variety of ventures in ensuring that optimum success is met. Many researchers agree that innovation is an ideal in any venture that aims at gaining a profitable market share but types and styles of innovation and their effects on performance differ from institution to institution (Schumpeter, 1947; Tribe, 2008; Singh et al., 2019; Benham et al., 2018). For example, Schumpeter argues that innovation can either destroy the existing system or bring on board new changes that will see any venture thrive. However, innovations that involve the creation of new products have greater impact on performance than innovation that only enhances marketing techniques (Schumpeter 1947; Tribe, 2008; So & Kang, 2014; Hammer & Pivo, 2016). This implies, therefore, that the wrong application of innovation can result in adverse consequences for tech startup ventures, such as making losses and eventually leading to their closure when looked at in isolation and not comprehensively. Conversely, any venture that adopts various styles of innovation effectively has a greater probability of growing and thus earning better returns. The twenty-first century has seen incredibly competitive ventures emerge; thus, only ventures that embrace all aspects of innovation will be able to survive in such markets (Singh et al., 2019; Benham et al., 2018).

In the context of this study, 'traditional innovation approaches' refers to the usual methods used by scholars to foster recommendations for tech startup performances, which could involve reference to the application of strategies and approaches for tech startups and their performance ambitions in the real world. The history of economic thought traces how innovation in the early theories of management brought about the present innovative economics (Blaug & Sawyer, 1987; Schumpeter, 1934; Schumpeter, 1942; Schumpeter, 1947). The twentieth century marked the re-birth of economic innovation spearheaded by agent scholars who realised the need to adjust to the dynamics of economic history (Schumpeter, 1934; Blaug & Sawyer, 1987; Bibi, 2019). Joseph Schumpeter, one of these scholars, based his arguments in the supply side of the entrepreneurial mechanism, while Bibi proposed his arguments towards the demand-side mechanism (Schumpeter, 1934; Blaug & Sawyer, 1987; Bibi, 2019).

Additionally, the innovation systems approach has also been recognised in dynamic economic systems but is important in innovation economics; the stage where the approach needs to evolve and advance (Marx, 1953; Saidi, 2017). Nonetheless, the role of an entrepreneur and top managers in a tech startup becomes necessary in explaining the process of dynamic innovation. According to Karl Marx, during the early years of the industrial revolution, specialisation was a mechanism used by the capitalists to enhance their interests in expanding their profit-making opportunities (Marx, 1953; Saidi, 2017). Marx

further observed that the scale of specialisation was limited by the need to enhance productivity, for instance by machines (Marx, 1953; Saidi, 2017). When the aspect of machinery is validated by capital accumulation, the outcome becomes the need for technological innovation. Another stage of economic innovation identified in the same theoretical line is expanded production, in which productivity is allowed to continually take place (Saidi, 2017). This kind of growth is imperilled by the social aspect of production; that is, the conflict over the distribution of income between the capitalists and the workers that further undermines the profitability of firms while creating instabilities in the business cycle (Saidi, 2017). This cyclical contradiction by Karl Marx is also explicated in the contextual argument by Michael Kawecki, which emphasises the dynamics of innovation economics (Blaug & Sawyer, 1987; Saidi, 2017). In this line of thought, the two factors of production, technological and human, determine the path of economic growth. These factors act as the first elements in the innovation framework where an entrepreneur and his top managers become an economic agent who introduces the innovative mechanisms as a means of fostering tech startup performance (Marx, 1953; Schumpeter, 1947; Martín-Rojas et al., 2013; Teece, 2018). In this framework, time becomes a crucial factor since it shows the progression of the innovation put in place; whether positive or negative. The feedback is therefore what spurs the next step towards productivity (Bibi, 2019).

Although the focus is on innovation as a process as opposed to more modern aspects of innovation which include product innovation amongst other types of innovation discussed in sections to follow, the entire process is termed as a risk since the limited view of seeing innovation exclusively as a process makes it susceptible to failure, emphasising implicitly the role of a comprehensive capabilities framework to strengthen the impact of a robust innovation strategy on tech startup performance (Arif, 2008; Martín-Rojas et al., 2013; Spriggs, 2016). As a result, this inability for traditional views of innovation solely as a process to provide conclusive answers, places significant emphasis on a shift in the mindset, technological and organisational structure within the firm, in order to realise the positive impact of the innovation on startup performance (Arif, 2008; Martín-Rojas et al., 2013; Spriggs, 2016; Teece, 2018).

Fostering the right combinations of innovation daily creates a new development, focus and direction for tech startups operating in very complex business environments. This review suggests that not all kinds of innovation are effective in driving performance in a tech startup as not all innovation targets every person in the tech startup, each process, each way of introducing new services to the market and not all are equally effective in changing the mindset of the entire organisation. Therefore, looking at traditional views of innovation, where styles of innovation are looked at in isolation, may not be adequate in determining a comprehensive view of what tech startups need to perform, since they are

often seen as a limited view of abstract facts that do not provide tech startups with a cohesive approach to exploiting complex business opportunities in the real world (Ganzer et al., 2017; Benham et al., 2018). What brings about innovation as the change or the need to improve society has become a research topic – trying to analyse the reasons behind successful diffusion of different types of innovation in tech startups. The sections below will highlight capabilities-based models of innovation diffusion and theories of innovation used to foster tech startup performance. These include the acceptance model, the chocolate model, the innovation model, innovation-diffusion theory and concerns-based adoption model.

5.3.2 Dynamic capabilities-based models in innovation literature

In the section below we examine some dynamic capabilities-based models used in innovation literature. The benefits and drawbacks of some of these is discussed and used as backdrop to shape the discussion on the specific second-order dynamic capabilities in innovation literature selected for the purpose of this specific study.

5.3.2.1 The Acceptance Model

This is a dynamic capabilities-based model developed by Davis in 1985. Its major arguments are based on the attitudes and expectations of innovation which are likely to affect the chances of it being adopted (Deslonde & Becerra, 2018). The focus of this model is the perception of innovation by its potential adopters in relation to its ease of use and relevance; how easy the innovation can be learnt and implemented, its relevance, and the degree of its usefulness in fostering startup performance (Raynard, 2017). According to Raynard, the ease of use and relevance of a specific innovation has a direct effect on the perceived usefulness for tech startups. The easier an adopter perceives the innovation and the more relevant that innovation is perceived to be to their objectives as a business, the higher the productivity and hence usefulness of said innovation in practice. Raynard (2017) concludes that there exists a significant relationship between relevance, ease of use and adoption and usefulness in enhancing tech startup productivity. Another study, examining innovation in startups, asserted that the key factors affecting a tech startup's participation in innovation are the top managers' ability to persuade the rest of the organisation, and not necessarily solely the perceived usefulness of a specific innovation since usefulness is sometimes only measurable at the end of the innovation process (Grush, 2016).

In their synthesis of the research evidence on the effects of capabilities-based approaches – in this case the firm's ability to diffuse styles of innovations that are considered useful – on tech startup performance, Teece (2018) found a dearth of research focusing on a comprehensive capabilities-based

approaches to innovation diffusion in tech startups. It is therefore difficult to determine with certainty the effects of a comprehensive capabilities-based approach to the conceptual understanding of innovation in relation to tech startup performance in the real world.

Despite this lack of consensus, research evidence suggests that these comprehensive approaches to innovation do not have an adverse effect on startups looking to improve their innovation output (Ganzer et al., 2017; Martin-Rojas et al. 2013). Given their integration of various styles of innovation, not just as a process but as a more robust measure of innovation as a precursor of performance, comprehensive capabilities-based approaches to innovation have the potential to drive performance in tech startups if well thought-out and executed. It was therefore necessary to explore other capabilities-based approaches to tech startup performance development by exploring other models of innovation diffusion as discussed in the sections below.

5.3.2.2 The Chocolate Model

The chocolate model in innovation was formulated by Dianne Dormant, whose focus was on innovation adoption and the subsequent changes to the organisation (Meule, Richard, & Blechert, 2018). The model revolves around three elements – the change adopters, the agent involved in change, and the organisation itself. As opposed to the acceptance model discussed above, the chocolate model is usually applied when implementing organisational changes while adopting innovation (Meule et al., 2018). However, literature about the effectiveness of this approach to developing drivers that may strengthen the impact of innovation on tech startup performance is sparse (see section 1.3).

Nonetheless, a few studies attempted to measure direct effects of comprehensive capabilities-based approaches to venturing in corporate environments. This includes a study by Martin-Rojas et al. (2013) in which individuals working across various departments across large established European technology firms were asked about their perceptions on collaborative learning and technical know-how in relation to their effects on their ability to disrupt their already successful selves. The results showed that though a comprehensive capabilities-based approach to innovation proved to yield positive results for self-disruption there were dissimilarities in sectors, specifically manufacturing firms and trade only firms. Another study conducted by Ganzer et al. (2017), which looked at various styles of innovation as a comprehensive capabilities-based approach to driving performance in the knitting sector, had dissimilarities in results for firms that were more technologically mature than for those less tech savvy.

Nevertheless, owing to the sparse literature in this space, this study and studies like this were unable to conclude whether these comprehensive capabilities-based approaches to innovation were more effective than the more traditional singular styled approach to innovation, a gap in knowledge this study sought to address by developing a robust model for successful tech startup venturing.

5.3.2.3 The Concerns-based Model

The concerns-based adoption model was developed in 1979 by Hall as an alternative to the traditional individualistic top-down approach towards change. The model was focused on the people impacted by the innovation that had been adopted and its implementation towards subsequent change (So & Kang, 2014). The model was aimed at addressing the concerns of the adopters during the adoption process. In this model, six assumptions were outlined regarding the challenges experienced during the study, namely:

i. Change involves developmental growth

ii. Change can be understood better when operational

iii. Change is highly dependable on personal experience

iv. Change can be accomplished by individuals with self-efficacy

v. Individuals are the focus of facilitation in innovation contexts

vi. Change is a process, not a singular event.

In summary:

- The adoption of any form of innovation to drive growth in an organisation poses a challenge in both traditional individualistic approaches and comprehensive capabilities-based approaches, especially for firms not endowed with technical capabilities.
- The mentioned theories of innovation suit different contextual situations in an innovation process and are only useful to tech startups if they are easy to use and relevant to the context. For instance, the comprehensive concerns-based model can be related to the current educational changes such as the adoption of e-learning initiatives in tech startups in more developed markets (So & Kang, 2014).
- Despite the differences, the commonalities in literature exist to emphasise the importance for literature to put forward suggestions that have undergone the scrutiny of a scientific enquiry about what combination of drivers could strengthen the impact of innovation on startup success.

- Many different individual factors – including the socio-political, external factors such as the environment and government policies and more – can influence the success of any innovation, especially when styles of innovation, ease of adoption and context relevance are not considered.
- The analysis of organisational changes and technological readiness and their relation to the innovation adoption is useful in ones' own tech startup during the early stages of adopting innovation. For instance, the concerns-based adoption model is useful in the creation of a comprehensive innovation configuration map that is essential for the desired change in the definition of expected behavioural change (So & Kang, 2014). On the other hand, it may also be useful in analysing organisational structures viable for the adoption of a comprehensive innovation process.

The study of the tech startup organisation provides important insights for the development of an appropriate plan for the initiation of a comprehensive capabilities-based driver model that is easy to use, relevant and comprehensive. A literature review of the precise innovation capabilities selected in this study and why they were selected is discussed in the sections below.

5.4.1 Product innovation in innovation literature

Production innovation refers to various changes and improvements made to a specific product and/ or service made available to consumers by the enterprise by making use of already present technology or in some cases completely new technologies (Tidd, Bessant, & Pavitt, 2005; Ganzer et al., 2017). It speaks to the development of new products and services that are considered first-to-market. It implies that product innovation can be achieved in three different forms, namely:

i. Development of completely new products such as delivery applications (Holtskog, 2015).

ii. Adding a new feature to an already existing product, such as the introduction of fingerprint scanners to mobile phones aimed at security measures (Holtskog, 2015).

iii. Performance enhancement of an already existing product, such as increasing the memory storage and camera resolution of phones (Holtskog, 2015).

A close analysis of the three forms of product innovation suggests that consumers are the target of any form of product innovation (Tseng, Lin, & Vy, 2012; Holtskog, 2015; Ganzer et al., 2017). Therefore, the entire process of product innovation aims at producing a solution based on the feedback from consumers. The solution must be able to address all the loopholes in the satisfaction of consumers in an exciting way. Besides, provided a product is new to the market, it should be made attractive, using the latest technology, and surpass the standards of similar products in the market. Other forms of

excelling in product innovation are through changing the design of the product to match the current market and giving preference to the customer requirements during the process (Holtskog, 2015; Ganzer et al., 2017). It is only through such innovation that a product can easily compete in any competitive market. A good example of this style of innovation in the literature was described as the redesigning of cars to electric cars (Holtskog, 2015). The innovation behind it helped consumers in regions where fuel was extremely expensive, thus having the same product in the market but redesigning one that surpassed the normal standards of cars using fuel.

The research evidence suggests that inconsistencies in understanding of this style of innovation and how it is generally implemented in practice have led to different arguments on its efficacy in the quest for tech startup performance development. Ganzer et al. (2071) and other researchers argued that new entrepreneurs may find it hard to understand the need for product innovation as research has traditionally only focused on innovation as a process. They argue that there are four main benefits of product innovation for tech startups, and these are:

i. Business growth and expansion

The demand that will accrue after the product is unveiled to consumers will be overwhelming, hence increasing the sales to consumers, which will automatically force the business to expand to accommodate such demands (Beckley, Paredes, & Lopetcharat, 2012; Sok, O'Cass, & Sok, 2013; Chang et al., 2015; Buhl, 2018).

ii. Ability to compete with similar products

Appropriate product innovation enables it to compete in any competitive market since the attributes of the product will attract more consumers (Beckley et al., 2012; Sok et al., 2013; Chang et al., 2015; Buhl, 2018).

iii. Retaining consumers because of satisfying them

The new product will satisfy all consumers since the product innovation relies on the feedback from consumers, thus the earlier customers will like the product even more (Beckley et al., 2012; Sok et al. 2013; Chang et al., 2015; Buhl, 2018).

iv. Acquisition of talent

Skilled employees only want to be involved with companies that are creative and innovative in bringing new products into the market. Therefore, they are able to learn and earn because opportunities only arise where innovation is practised (Tseng et al., 2012; Beckley et al., 2012; Sok et al., 2013; Chang et al., 2015; Buhl, 2018).

Consequently, product innovation ought to be adopted by a variety of companies globally to grow their customer base and in turn earn a significant share in the competitive market. Finally, since product innovation is aimed at both the content and appearance of the product, consumers are therefore attracted to the product, thus increasing the demand for the product (Paladino, 2008; Tseng et al., 2012; Beckley et al., 2012; Buhl, 2018).

The literature suggested the inclusion of product innovation as part of a comprehensive capabilities-based approach to tech startup performance development in this study as it may yield effective results in the African market where research is sparse and oversimplistic. The section below discusses innovation as a process often used in traditional approaches to performance development in innovation literature.

5.4.2 Process innovation in innovation literature

Process innovation refers to the different ways an organisation is able to change the ways or methods through which new ideas, products or services are introduced into the market; specifically, how they are made and how they are moved into the hands of the consumer (Tidd et al., 2005; Mendi & Costamagna, 2017; Ganzer et al., 2017). This relates to the formulation of new and exciting ways of building new websites or applications in the case of the digital industry or different, more efficient ways of assembling new products or services in the manufacturing industry (Ganzer et al., 2017). Since process innovation cuts across ideas and products, its adoption should be limited to the models provided to ensure that the end product is more satisfactory to the consumer.

Process innovation has been on the rise globally especially in digital high-tech organisations where companies are either producing new product development processes in the market or modifying already existing processes to meet growing consumer needs (Ganzer et al., 2017). Since process innovation adoption is growing, techniques ought to be adopted to make the endeavour a success. Process innovation entails a strong combination of applied technology, facility/tools investment, and human capital investment in the skills area (Ganzer et al., 2017). Therefore, process innovation should be handled with care and with adherence to established procedures. Even though a number of authors have suggested these tactics to help with process innovation, Deshphande (2018) most recently argued that a staged approach is the best model any company globally could adopt for a successful process innovation (Deshpande, 2018). He argues that four primary stages should be followed during the innovation process, namely strategy formulation, design formulation, product development, and product launch (Deshpande, 2018). The four stages can be summarised as shown in Figure 5.1 below.

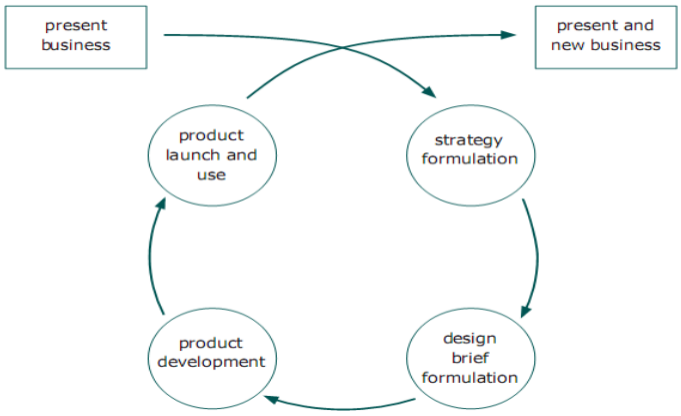


Figure 5.1: Four stages of the innovation process. Author's summary based on Deshpande (2018)

The strategy formulation stage entails analysis of the present situation of a product or idea that is already in the market to establish its strengths, limitations, and competition from similar products (Deshpande, 2018). During this stage, the strengths and limitations of the product are discussed, based on the market share. The strengths are often upheld while the limitations are modified to meet consumers' demands. Competition from similar products or ideologies is analysed and appropriate solutions adopted to curb extreme competition. The design formulation stage entails collecting views from consumers and experts regarding how to improve the product in the market (Deshpande, 2018). The outstanding ideologies are adopted and fed into the system for a better end product. The product development stage will adhere to developing the product, basing it on the adopted ideas. It will only follow the agreed inputs to the system since there is an expected outcome after the process. Therefore, any slight omission or addition of what is fed to the system might change the expectation of the outcome. The final stage of the product innovation process entails launching the product or ideology back to the consumers after the modification process to meet the consumers' needs (Deshpande, 2018).

Process innovation is only valued internally, since it cannot be seen by consumers. This makes it crucial for tech startups to not only implement effectively but to also ensure it is relevant to growth and expansion aspirations (Mendi & Costamagna, 2017). The entire change of technology employed during process innovation ensures that the end result is appealing to consumers and therefore market growth is enhanced. The primary benefits of process innovation are reduction of the cost of production incurred by any company and having the lowest risk compared to the other types of innovation (Cozzarin, 2015). Ultimately, the research evidence suggests that more revenue will be brought into a tech startup that adopts a process innovation that is well-crafted and market relevant.

The literature suggested the inclusion of process innovation as part of a comprehensive capabilities-based approach to tech startup performance development in this study as it may yield effective results in the African market where a dearth of information exists regarding its inclusion in non-traditional approaches to performance development in tech startups. The next section discusses another newer style of innovation often used in more developed environments but still nascent in African innovation literature.

5.4.3 Marketing innovation in innovation literature

Marketing innovation, also known as business model innovation, refers to the competitive standing of the organisation and speaks specifically to changes, improvements, and developments in the context of which items are introduced to the customers by placing significant emphasis on either existing needs of customers or by creating new needs (Mendi & Costamagna, 2017; Ganzer et al., 2017). It refers to the creation of novel power and sales leadership structures within the organisation that meet customer needs better than competitors do (Ganzer et al., 2017). Marketing innovation specifically implies how a product is introduced into the market after completion of the other two types of innovation. As the most challenging of all types of innovation, it plays an essential role in any organisation by providing main necessities for change to meet market needs (Cozzarin, 2015; Teece, 2018). Often, organisations tend to employ strategies that make any product a success and profitable to the company. Therefore, some researchers suggest that any product that is unveiled to the market is placed using the same strategy despite many other available strategies to launch the product to the market (Ganzer et al., 2017). Other researchers argue that such decisions should be analysed first before being implemented since some strategies result in conflicting expectations of the product in the market which in turn could result to losses (Swaiess & Yamin, 2020).

Market innovation is regarded more critical and riskier when compared to other types of innovation. It implies that despite successful product and process innovation, market innovation can ruin their success when it has no impact in the market (Martin-Rojas et al., 2015; Mendi & Costamagna, 2017; Teece, 2018). For instance, some companies such as Uber, which majored in market innovation, have done really well, breaking the established dominant organisations such as taxis. Therefore, market innovation is undeniably the most essential type of innovation since it can attract more customers and therefore enable a business to grow and expand (Swaiess & Yamin, 2020).

Despite existing organisations boasting of a significant customer base, startup ventures are employing the market innovation model to penetrate the market (Ganzer et al., 2017). It is therefore advisable that all organisations, new or existing, must address market innovation for survival in the increasingly competitive market. For instance, Amazon got rid of its traditional individualistic approach to

innovation that focused on a single-strategy approach to customer service, which entailed retail supply, to adopt a more comprehensive approach that relied on disruptive marketing innovation relationship with its customers to remain relevant in the market (Deshpande, 2018). The continuous adoption of appropriate market innovation is becoming the centre of market competition. Some organisations fear adopting market innovation due to the associated risk, since it entails application of a marketing method that the organisation has never before adopted.

Although market innovation is risky to any organisation, its benefits play a crucial role in the expansion of such organisations. Market innovation enables companies to increase competition relative to other companies producing similar products (Cozzarin, 2015). In addition, it increases the turnover of companies, which in turn enhances the profit margin. Furthermore, it enhances the brand recognition and value, hence increasing the customer base of the product (Cozzarin, 2015). An increase in recognition rate of new products and services in a startup is directly proportional to the growth of the customer base of the product, and for an increased customer base suggests that sales are bound to increase so that business expansion is achieved. Buhl (2018) argued that marketing innovation as part of comprehensive view of innovation will be ineffective if it does not involve the customer in the process in a way that helps them understand the unique selling points of the product or service. This is a view that implies the importance of a customer-centric approach to marketing innovation as a means to foster tech startup performance.

Research evidence therefore seems to suggest the inclusion of marketing innovation as part of a comprehensive capabilities-based approach to tech startup performance development in this study as it may yield effective results in the African market where a dearth of information exists about its inclusion in non-traditional approaches to performance development in tech startups.

The section below discusses organisational innovation often used in more developed environments but still nascent in African innovation literature.

5.4.4 Organisational innovation in innovation literature

Organisational innovation refers to both the management process and the mindset of the individuals within an organisation (Mendi & Costamagna, 2017; Ganzer et al., 2017). It speaks directly to changes in the prevalent mental models that structure what the enterprise sets out to achieve (Mendi & Costamagna, 2017; Ganzer et al., 2017). The concept is therefore born out of the strategic initiatives employed by the organisation through a newly created enterprise to gain a competitive advantage. As a result, organisational innovation can be classified into three forms, as follows:

i. *Organisation design* and structure entail how an organisation is structured from the top management to the grassroots workers and how the structure can affect its propensity to innovativeness. The structure should accommodate an appropriate communication model that will see all staff members communicating and sharing freely (Swaiess & Yamin, 2020).

ii. *Organisational learning* focuses on the acquisition of external knowledge by the organisation's staff members and how they use it to be innovative. The knowledge acquired should be used to produce solutions to problems affecting the organisation (Rezaei, Allameh, & Ansari, 2018).

iii. *Organisation change and adoption* analyse the external components affecting the organisation and in turn innovate a strategy to curb or adapt to such factors, for instance, adopting advanced technology to compete with other organisations (Swaiess & Yamin, 2020).

Organisational innovation can be enhanced in any organisation by the top management. It is only through such strategies that any organisation can ensure full commitment from its employees (Ganzer et al., 2017). Such a commitment ensures that the company is fully functional and profitable. An organisation can adopt the following strategies to ensure that creativity and innovation are encouraged in its employees: give workers a reason to care, empower workers, and rethink their place in comparison to their competitors (Swaiess & Yamin, 2020).

Research evidence suggests that organisational innovation is also about an organisation's ability to manage the introduction of novel ideas in a way that make individuals that work there feel like an integral part of the company. Swaiess & Yamin (2020) suggest that this can be achieved by ensuring their input is always welcomed and ensuring that employees in tech startup environments are made to feel comfortable and encouraged – during working hours – to engage in activities not necessarily related to their job function. Organisational innovations like these have been said to foster a culture of autonomy and proactivity, key ingredients tech startups need to grow and develop (Swaiess & Yamin, 2020).

Other studies corroborate this view by suggesting that individuals working in tech startups be given the freedom to make decisions in an organisation for the free flow of responsibilities to occur (Rezaei et al., 2018). This is how employees in tech startups often feel empowered. The actions taken after a mistake has occurred in an organisation should involve workers since placing the blame on workers will quite often make them fearful of making decisions in future due to the possible consequences.

Therefore, accepting the fact that no-one is perfect and prioritising working as a team will foster organisational innovation and ultimately productivity (Ganzer et al., 2020).

Finally, workers should be given the freedom not only to fail but to fail frequently in the workplace to create room for innovation and experimentation (Rezaei et al., 2018). Organisations should adhere to the recommended working hours regulation so that workers find adequate time to think and come up with innovative ideas meant to help the organisation grow and remain competitive (Deshpande, 2018).

It is evident that organisational innovation involves mainly internal matters, with the structure of the organisation being centred (Akin, 2017). An appropriate structure will see workers associating comfortably and in turn enhancing the profitability and success of the organisation, hence highlighting the importance of organisational innovation in any company (Akin, 2017). Most companies adopt organisational innovation to differentiate themselves from others. It is aimed at saving time, capital and creating new innovative offerings to customers' other resources. Such organisations enjoy a competitive advantage compared to others since they have a productive plan often lacking in other companies.

In summary:

The research evidence on the use of product innovation, process innovation, marketing innovation and organisational innovation as part of a comprehensive capabilities-based approach to driving tech startup performance, though sparse, seems to suggest that its inclusion has proven effective in tech startup growth and development. Almost all these studies on the performance effects of a comprehensive capabilities-based approach that includes product, process, marketing, and organisational innovation were conducted outside the African continent. The question is whether the use of this approach in the African setting would yield better results for performance than the more traditional individualistic approach currently used in the innovation process in tech startups.

5.5 ENTREPRENEURIAL ORIENTATION AS A DRIVER

The entrepreneurial orientation (EO) of an entire organisation requires a proactive mindset, and a risk-taking and innovative approach that is multi-faceted and multi-disciplined (Martín-Rojas et al., 2016). It requires the dissemination of technology across the entire organisation and thus requires support and commitment beyond the divisional level for the long-term sustainability and survival of the organisation (Adewale & Babatunde, 2015; Martín-Rojas et al., 2016). Entrepreneurial orientation also

entails the practices, involved processes, and styles of decision-making adopted by an organisation based on its vision.

Entrepreneurial orientation is defined as a multidimensional concept, present at the firm level, which describes an organisation's entrepreneurial behaviour and embraces at least three dimensions, namely: risk taking, innovativeness and pro-activeness (Martín-Rojas et al., 2016). Earlier research studies have proved entrepreneurial orientation to be one of the primary predictors regarding the performance of any venture (Covin & Slevin, 1991). Such studies have attracted significant opposition from other scholars who have based their argument on the style, implementation, and application of entrepreneurial orientation (Dayaratne & Gunawardana, 2015). They argue that entrepreneurial orientation cannot enhance the performance of all firms; rather, its style and implementation under the correct circumstances may result in a better performance. Therefore, any venture that applies entrepreneurial orientation in isolation or applies entrepreneurial orientation inappropriately will find it difficult to thrive in the market.

However, entrepreneurial orientation is measurable, which makes it easier to track and measure. There are three major ways of measuring entrepreneurial orientation. The Covin and Slevin (1991) scale, computer aided text analysis (CATA)is considered one the most effective ways used to measure EO. The Covin and Slevin scale outlines EO as a collective catchall that represents a firm's ability to be entrepreneurial across a wide range of contexts (Liu, 2016). Researchers have established that earlier studies on EO employed the Covin and Slevin (1991) scale since it was rated as highly effective due to its capability of producing similar results to other variants. The Covin and Slevin (1991) scale utilises nine psychometric items to provide substantive feedback, a comprehensive capabilities-based model the research evidence suggests may prove efficient for tech startup performance development in the African context. Also, the research evidence suggests that traditional measures of EO that examined these elements individually in relation to performance have been significantly advanced to contain a comprehensive, dynamic view of EO for analysis and implementation for tech startups (Belderbos, Grabowska, Leten, Kelchtermans, & Ugur, 2017).

Finally, the research suggests that comprehensive dynamic capabilities-based measures of EO may be a more promising technique for fostering business growth since dynamic capabilities-based measures of EO tend to provide answers in domains where traditional survey-based tasks have struggled (Dayaratne & Gunawardana, 2015). The literature suggests that comprehensive capabilities-based measures of EO are most preferred due to their ability to combine innovativeness, proactiveness and risk-taking in a way that makes understanding of the complex phenomenon a little easier.

5.5.1 Traditional approaches to entrepreneurship

Entrepreneurial orientation is defined as a multidimensional concept, present at the firm level, which describes an organisation's entrepreneurial behaviour and embraces at least three dimensions, namely: risk taking, innovativeness and pro-activeness (Martín-Rojas et al., 2016). Traditional approaches to entrepreneurial orientation in earlier research studies have proved entrepreneurial orientation to be one of the primary predictors regarding the performance of any venture. Such studies in recent times have attracted significant opposition from other scholars who have based their argument on the implementation and application of entrepreneurial orientation. They argue that entrepreneurial orientation cannot enhance the performance of all firms; rather, its implementation under the correct circumstances can result in a better performance. Therefore, any venture that does not apply entrepreneurial orientation appropriately finds it difficult to thrive in the market.

The entrepreneurial orientation (EO) of an entire organisation requires a proactive mindset, a risk-taking and an innovative approach that is multi-faceted and multi-disciplined. It requires the dissemination of technology across the entire organisation and thus requires support and commitment beyond the divisional level for the long-term sustainability and survival of the organisation (Adewale & Babatunde, 2015; Martín-Rojas et al., 2016). Entrepreneurial orientation also entails the practices, involved processes, and styles of decision-making adopted by an organisation based on its vision.

Entrepreneurial orientation has emerged as the driver of most entrepreneurs globally, making them successful in their ventures but requiring a change in thinking not traditionally present in entrepreneurial literature (Deshpande, 2018). For instance, Michael Dell adopted the EO appropriately by starting an upgrading venture of computers in his dorm and eventually founded his own company, Dell Inc. Being one of the many entrepreneurs having applied EO to their ventures to thrive, he also revealed that adoption alone, or a risk-taking attitude alone cannot make a business thrive (Deshpande, 2018). One must have a combination of a multiplicity of attributes to succeed in entrepreneurial life. Indeed, the disjointed views of looking at autonomy, adoption, risk-taking and the likes in isolation necessitated a deeper understanding of an organisation and how to build a stable and profitable business (Adewale & Babatunde, 2015; Martín-Rojas et al., 2016). The shortcomings of traditional approaches to entrepreneurship imply that an entrepreneur should always seek a comprehensive capabilities-based view of EO as a major driver of success. It is recommended that executives of any organisation develop a strategy of ensuring that a comprehensive view of EO is stronger for organisation success. It can be achieved through the entire staff of an organisation possessing attitudes and portraying behaviours that form part of the EO of the organisation (Teece,

2018). Also, employees should be in the front line in advocating innovation through the provision of new ideas aimed at achieving the set goals of the organisation.

It is against this backdrop that this study put forward a comprehensive dynamic capabilities-based approach to entrepreneurship and why these could have a greater impact on fostering performance development for tech startups on the African continent.

5.5.2 Entrepreneurial orientation in tech startup literature

Entrepreneurial orientation is regarded as the core component in the entrepreneurship venture in dynamic capabilities-based models, as it plays an essential role in taking any venture to the next level, provided it is correctly adopted (Kock & Gemünden, 2020). It helps the management team in these startups as it reflects the vision and mindset of the firm, hence making it possible for the management to note the extent of effort required for innovation. The innovation is aimed at ensuring that customers are satisfied with the products and the process of service (Kock & Gemünden, 2020). Although management styles may adhere to the ideological aspect of the firm, some decisions may be limited to either the condition of the firm, limited resources, or economic considerations (Farinha, Ferreira, Nunes, & Ratten, 2017). Such limitations make a firm unable to cope with the existing competition, thus risking their ability to stay in business. At this point, entrepreneurial orientation comes to the aid of the firm by providing the framework that helps the management to understand the organisation's attitude towards exploiting and seizing opportunities (Teece, 2018). The framework used in this study thus may have the ability to help tech startups highlight the need for a comprehensive view of opportunity exploitation that looks not only at a comprehensive view of EO but a combined view of EO and IC as well and further provides a novel dimension upon which a tech startup can attain optimum growth and expansion.

Besides, entrepreneurial orientation can further have positive implications in diverse groups of services such as practical implications, originality, and social implications (Ma'toufi & Tajeddini, 2015). Firms that have adopted entrepreneurial orientation have experienced positive practical implications. Practical implications arise from the hands-on services that are offered at any firm. Firms with the capability of investing in a practical field will eventually perform better since the provision of services is improved (Ma'toufi & Tajeddini, 2015). As a result, customers feel comfortable with such services, enhancing the practical implications experienced in such firms. In addition, the social implications highlight the relationship between the firm and its customers, ensuring that tech startups strive to ensure that services are offered appropriately to their customers. For instance, research into the health tech startup industry in Europe revealed that many healthcare facilities who ensured that they embraced technological channels to keep in touch with their customers did so because of a change in

mindset (Şehbenderoğlu, 2019). Most of them offered services remotely and built digital capabilities that were previously cumbersome and manual to manage, all thanks to the adoption of an orientation within the firm that was entrepreneurial in nature (Şehbenderoğlu, 2019).

Despite employing a capabilities-based approach to entrepreneurial orientation, the products still need to maintain their value and originality for the sake of consistency, something only present in individuals with an entrepreneurial mindset. Customers will be willing to continue using certain products as long as they retain their originality (Ma'toufi & Tajeddini, 2015). For instance, customers would continue consuming new versions of an existing product if the product retained the same identity while changing certain constituents of the product. It for this precise reason that this study sought to investigate whether a comprehensive dynamic capabilities-based model that looked at a combined view of both entrepreneurial orientation and innovation capabilities could impact performance development in tech startups on the African continent.

Some of the second-order dynamic capabilities of entrepreneurial orientation are discussed in the selection below and reasons why they were selected for the sake of this study are argued through a review of literature.

5.5.3 Risk taking in entrepreneurship literature

Risk taking

The entrepreneurial orientation of an organisation is defined as a concept that encapsulates an enterprise's strategic position, mind-set, and conductivity of its internal climate towards entrepreneurship (Petzold, Landinez, & Baaken, 2019). Theoretically, the concept of entrepreneurial orientation has evolved conceptually to become a phenomenon that is closely associated with straightforward policies and actions for the expansion of entrepreneurial activities and decisions and the path that leaders must take in organisations to grow their long-term vision, strategic objectives and build their competitive advantage (Martens, Machado, Martens, De Oliveira e Silva, & De Freitas, 2018; Mullens, 2018).

Risk taking as a second-order dynamic capabilities dimension can be defined as the act of taking a bold action (Mullens, 2018). Despite the action being regarded as risky, they are always attached to specific goals after implementation. Therefore, the risk-taking element of a firm's entrepreneurial orientation refers to the ability of individuals and entrepreneurs within these startup organisations to exhibit boldness when venturing into untapped and complex waters (Brahma, 2020; Martens et al., 2018). For instance, in one study conducted on Starbucks in 2009, the study showed that the action taken by Starbucks to distribute its products in a new way was very risky, but the outcome of the action was

worth it (Brahma, 2020). Risk taking in tech startup literature speaks to a firm's ability and willingness to commit time and resources to endeavours with very uncertain outcomes but with prospects of extremely high yields on investment. Some authors have argued that this dimension of a firm's entrepreneurial orientation can lead to increased levels of innovation in product creation, process renewal, marketing and organisational innovation specifically (Alvarez-Torres, Lopez-Torres, & Schiuma, 2019; Martens & Carvalho, 2016).

Although many believe that entrepreneurs are risk takers in everything they do, that belief has not always translated to outright success for tech startups in the past – something has always been found missing (Alvarez-Torres et al., 2019). The tech startup's venture into risky business territories only kick-starts after distinctive planning, future forecasting, and several capabilities largely untested empirically (Martens & Carvalho, 2016). The planning and forecasting play a crucial role in the assessment of both the present and future market, hence minimising the risk of uncertainty. For instance, organisations tend to study the market trend before launching a new product to the market to avoid product failure and not achieving the set objectives for the product (Mullens, 2018). Therefore, risk taking is one of the strategies that entrepreneurs use to enable them to thrive in any market. Any organisation that prioritises risk taking aiming at gaining more revenue and market has always excelled, regardless of the period taken to achieve their goals (Martens et al., 2018; Mullens, 2018). Generally, risk-taking firms ought to be financially stable, such that in case more financial allocation is required to boost the risk undertaken, it will be readily available. Furthermore, risk-taking firms experience more benefits compared to other firms. Despite competing for the same market share, risk-taking firms have the upper hand, enabling them to thrive in such markets (Brahma, 2020). The major benefits enjoyed by such firms include enhanced creativity, unforeseen opportunities, increased confidence of both employees and employers, development of new skills, and development of emotional resilience (Ahmad & Azhari, 2020). Such benefits will automatically phase out other firms since they cannot match the new market standards.

On the other hand, risk taking can be disastrous to an organisation as it will cost the organisation too much without reasonable revenue. Failure to plan effectively before adopting a risk-taking strategy may lead to poor financial records of the organisation due to the extreme expenditure (Ahmad & Azhari, 2020). It is recommended that before adopting the risk-taking strategy, firms should gauge themselves and invest what they cannot afford to lose since no one is sure about the outcome of the strategy.

Therefore, as much as risk taking is ideal to all firms it becomes particularly important for tech startups to know what to do to drive this capability. What we do know is that the planning and analysis of the

market are typically the first steps to take before implementing any strategy (Ganzer et al., 2017). More specifically, risk taking should be limited to exploiting new opportunities in the market and not to match the standards of competitors in the market. It is for this precise reason that the selection of risk taking as part of comprehensive capabilities-based approach to EO seemed justified to employ in this study as part of tech startups' quest to increase performance measures.

5.5.4 Proactiveness in entrepreneurship literature

Proactiveness

The relationship between a firm's entrepreneurial orientation and its ability to perform eventually has typically been researched in the context of exploring the antecedents that comprise entrepreneurial activities in organisations. In fact, researchers argue that the most researched topic in the field of entrepreneurial orientation is its connection to organisational performance over at least the last 30 years (Martens, Lacerda, Belfort, & Freitas, 2016; Martens et al., 2018). A common argument that is put forward in the context of entrepreneurial orientation and improved organisational performance is that entrepreneurial orientation may be seen as the entrepreneurial strategy-making procedure that influential decision-makers in the firm employ to foster their enterprise's sustained vision, drive and unique competitive edge (Maddison Warren, 2016).

The proactiveness element is described as the enterprise's tendency to remain ahead of its competitors and to constantly remain ahead of the curve when it comes to its internal activities. It speaks to an organisation's ability to take initiatives without being reactionary to change and this is measured through its ability to continuously unveil novel products, technical projects or services, to be a leader and not be considered a follower in their respective industry (Alvarez-Torres et al., 2019; Mullens, 2018). It further implies that organisations always anticipate opportunity-seeking ventures rather than waiting for an opportunity to arise. It is the only way any organisation can always be a leader since the opportunity is looked for and not waited for, while scrambling with other competitors. Research has shown that businesses that are able to anticipate massive changes that may affect their business model are typically organisations that exhibit increased levels of innovation capabilities across various departments in the organisation (Brahma, 2020; Martens et al., 2018).

Proactiveness in any organisation enables it to compete at an alarming rate compared to the rest in advance of the shifting demands of any market. Usually, such firms are the first to enter such markets and seize the entire market share.

On the other hand, other researchers have argued that being proactive can be very risky because firms sometimes lose sight of what is currently important to customers (Brahma, 2020). Proactive firms tend

to provide more improved products and services of the initial ones that sometimes do not meet the market needs because the startup was too focused on being 'proactive' as opposed to being customer centric (Brahma, 2020). Such a strategy could sometimes see customers shifting from the products of one firm to the other. However, other researchers have argued that being proactive is precisely being customer centric (Alvarez-Torres et al., 2019). They argue that startups who think about the long-term success of their firms instead of looking for short-term gains are the most proactive (Alvarez-Torres et al., 2019). For instance, a communication company that avoids venturing into rural regions may be phased out by another proactive communication company which decides to venture into all regions. The proactiveness of such a company sees an opportunity in rural regions generally avoided by existing companies and thus upgrades its services to serve its customers everywhere, including the rural regions previously untapped. The research seems to imply that through venturing into opportunities that seem a threat to others, proactive executives gain profitable positions globally in technologically complex and politically wild environments.

Tech startups in recent years have been noted to have shifted towards the hiring of proactive employees because of their potential benefits to any organisation (Alvarez-Torres et al., 2019). The proactiveness of employees will result in the generation of new ideas on how to make work better and more accurate (Bedi, 2018). Therefore, with such employees on board, these tech startups are able to maintain high levels of productivity in extremely dynamic environments and hence are able to compete favourably and adapt easily to market demand shifts. All this is achieved because of the proactiveness put in by employees. However, as the research on risk taking reveals, proactiveness acts like a double-edged sword. If not implemented correctly, proactiveness can do more harm than good. It is advisable that one becomes proactive in his /her area of specialisation to avoid blunt ideas (Bedi, 2018). Some employees who have been proactive and suggested new ideas that failed to work for the organisation have been dismissed (Alvarez-Torres et al., 2019). Therefore, as much as proactiveness will benefit an organisation, it can also be the reason for negative effects, given that the idea implemented might never work (Bedi, 2018).

However, proactiveness when properly employed entails coming up with a change in a specific direction with the aim of improving the already existing platforms and ensuring that customers have a positive response to the new products in the market. It should be adopted only when a viable idea is brought on board and analysed to avoid the negative impacts of proactiveness.

5.5.5 Innovativeness in entrepreneurship literature

Innovativeness

The last dimension put forward in this study is the concept of innovativeness in thinking and action as a second order dynamic capabilities dimension of EO. This concept speaks to the tech startup's ability to rejuvenate its existing ways of doing business and its ability to discover novel prospects by changing the culture of how it thinks and how it implements (Colombo, 2016). It speaks directly to the creativity of the individuals in the organisation and their ability to continuously experiment through research and development. Innovativeness also entails a firm's ability to supplement activities that may result in new products or services (Brahma, 2020; Martens et al., 2018). Firms that exhibit behaviours of innovativeness are thus capable of carving out an advantage for themselves by constantly being the first to market with new products or services and therefore are able to reap the rewards that such an advantage affords them (Brahma, 2020). Some of these advantages, especially in digital technology startup organisations, include the ability to charge a premium for products, since they are often first to market in their specific industry, but also the ability to exploit novel markets ahead of their competitors (Ndemezo & Kayitana, 2018; Brahma, 2020). Ndemezo and Kayitana (2018) argued that nurturing innovativeness in tech startups has benefits for increased levels of innovation and consequently organisational performance.

It is thus likely that the ability to think innovatively and creatively, when looked at in conjunction with the startup's ability to be proactive and take on calculated risks, may lead to increased levels of performance, as suggested by this study. If the research evidence also suggests that a comprehensive dynamic capabilities-based view of innovation may affect startup performance development positively, it does seem fair to suggest that a comprehensive look at both EO and IC may yield better performance results, as this study suggests.

5.6 ORGANISATIONAL PERFORMANCE IN TECH STARTUP LITERATURE

Organisational performance in tech startup organisations takes on many forms. Given the complexity of understanding the performance of a business that is still in its initial stages, researchers in this field have suggested elements that firms should consider when measuring firm performance more efficiently in high-tech settings (Martín-Rojas et al, 2016; Ganzer et al., 2017). These include growth in sales, growth in revenue, growth in user base or customer activity and growth in market share (Martín-Rojas et al, 2016; Ganzer et al., 2017; Putri et al., 2019). Understanding organisational performance in relation to high technology businesses in this light consequently requires that the performance measurement of startup firms be conducted in a manner that aids the hyper-innovative and

entrepreneurial environment and strengthens areas where a lack of historical data is present to inform the firm's sustained performance (Ganzer et al., 2017).

Furthermore, it is not news that organisational performance is often confused with organisational effectiveness, especially in the startup context, since organisational effectiveness was previously used to measure how well a startup is doing, as the more standard profit/loss performance measurements more commonly used to measure performance in established business proved inefficient (Putri et al., 2019). Organisational effectiveness, however, covers an enormous scope and does not allow for the dynamic lens required to understand what drives the performance of startups and how to foster these drivers (Putri et al., 2019). There are *true* measures of organisational performance for high-tech startups that have been used by entrepreneurial scholars that provide more clarity than old measure organisational effectiveness ever could (Singh et al., 2019). The existing literature on organisational performance in startups has been focused on individual drivers of performance. Martín-Rojas et al. (2016) examined the effect of top managements' capabilities on organisational performance and found that the more effective the top leadership in a startup is, the greater the firm's ability to perform. Ganzer et al. (2017) also believed that the greater the entrepreneurial mindset of specialists in a startup was, the more effective their ability to perform became. Many researchers have linked innovation absorptive capacity to organisational performance in the startup context, but it is still unclear how and to what extent each of these disparate capabilities should be developed (Matin-Rojas et al., 2016; Ganzer et al., 2017; Singh et al., 2019).

The gap in the literature is clear, as other researchers have argued that linking innovation to performance or linking technology absorption is an oversimplification, since so many startup organisations continue to fail (Ganzer et al., 2017; Teece, 2018; Singh et al., 2019). These researchers argue that current environments have specialists in these startups more focused on organisational performance, more so than the strategic approaches that drive well-thought-out processes which could lead to more sustained favourable results for the organisation. Therefore, some researchers have argued that a failure to perform or a failure to achieve a set of goals and objectives is a result of the startup's poor strategic approach and inability to truly drive what is needed to take the organisation a notch higher (Alqahtani, 2020; Babatunde et al., 2020).

The scope of organisational performance theory traditionally encompasses three primary areas of research, namely: financial performance, shareholder value performance, and market performance (Alqahtani, 2020). It is believed that the successful application of these three areas of performance gives the most holistic and robust measurement view of a startup's overall performance (Alghahtani, 2020).

5.6.1 Traditional approaches to organisational performance

Globally, tech startups traditionally were not simply looking for ways to disrupt the status quo but were on a determined path to outsmart and outlast larger incumbent organisations (Wahyuningsih, 2019). These firms in the past experimented with various methods and approaches in a quest to drive not only product delivery but a sustained firm performance (Ho & Odhiambo, 2015). Tech startups have attempted to create internal processes to foster growth and become more profitable and realise returns for their investors but have often found that traditional measures of performance that looked at financial performance were inadequate and irrelevant in describing the performance of businesses specifically designed to create value for shareholders typically over an extremely long period of time (Putri et al. 201). As a result of this complex reality for executives internally (because of fierce competition) and externally (because of building value for shareholders), the quest for understanding how to measure organisational performance for tech startups became vital in determining their longevity and survival (Putri, Nurwiyanta, Sungkono, & Wahyuningsih, 2019). Traditionally, approaches to organisational performance focused on achieving outcomes for the sake of gaining increased market share but research evidence suggests that a multi-dimensional approach to performance that includes an increase in market share but also an increase in financial and human capital commitment from the firm's investment could yield better results for high-tech firms just starting out (Martin-Rojas et al., 2016; Teece, 2018). Therefore, it is recommended that startups develop an internal culture that rigorously focuses on upholding a multiplicity of capabilities that measure organisational performance in a startup context for effective planning and allocation of resources to enhance the business's development (Putri et al., 2019; Algahtani, 2014). Research evidence suggests that traditional approaches to performance may be relevant in corporate settings where operational processes are more clearly defined but implies that a set of dynamic capabilities, whether it be user growth, product delivery, financial performance or market penetration, may be more effective in acting as indicators of business development, hence playing a crucial role in the future planning of the startup.

Furthermore, traditional approaches to organisational performance would often see investors prematurely conclude that their investments were unsuccessful, due to the inability of tech startups to achieve a set of goals, leaving founders under significant pressure to figure out strategies to apply to ensure that shareholder needs are met (Putri et al. 2019). Culpability as a result of a lack of performance often tends to flow downwards to specialists in these firms involved in the strategic planning, executing and advisory processes, thus ultimately negatively impacting the productivity of the tech startup as a whole (Ho & Odhiambo, 2015). Shareholders who have traditionally invested in more established businesses often struggle to understand that most tech startup organisations are

extremely risky ventures, even more so on the African continent, but have often looked at organisational performance from a very corporate lens, not considering nuances that provide better solutions for tech companies in the early stages of development (Chen et al., 2016; Putri et al., 2019).

It is against this research evidence that this study in the sections below discusses a comprehensive dynamic capabilities-based approach to organisational performance and why these could have a greater impact on fostering performance development for tech startups, particularly those on the African continent. in addition, the sections below discuss the growing concerns surrounding traditional approaches to top management capabilities, technological competence and organisational learning and explore gaps in understanding for tech startups looking to foster performance development.

5.6.2 Financial performance in organisational performance literature

Traditionally, the core factor of organisational performance of any organisation has been its financial muscle. Even in the startup context where specialists and venture capitalists alike are not looking for profitable businesses early on, a reduction in costs and an allocation of financial resources towards technological outputs are crucial in the measurement of the firm's organisational performance (Linton & Kask, 2017; Teece, 2018; Singh et al., 2019). The financial health of an organisation is the backbone of both the operations and successful implementation of various strategies. Financial performance is often analysed based on an organisation's performance at the start of its financial year and at the end of the financial year for both large corporates and startup enterprises. Financial performance is often defined as the independent measure of how effectively an organisation can utilise the available assets in monetary terms from its primary business model (Linton & Kask, 2017; López, Neves, & Cunha, 2019; Putri et al., 2019). What most investors struggle to grasp or find consensus on, is how they effectively measure the performance of their various investments in startups looking to turn a profit in seven years and sometimes even in ten years (Linton & Kask, 2017). Some researchers have argued that the financial performance can be gauged through observing the return on both assets and investments. In other words, some researchers in the field of financial investment have argued that the value-added on the initial investment provides the analysis of the financial performance of an organisation (López et al., 2019). In the startup context, financial performance often refers to the startup's ability to generate revenue, albeit less than the cost incurred by the business, as well as the startup's ability to generate multiple revenue streams and reduce cost of sales through the application of its disruptive and largely unique technological software application (Martens et al., 2016; Martens et al., 2018).

Startup businesses tend to collapse along the way due to inadequate finances required to keep the business in operation before profits start flowing in. For instance, companies with a fixed budget

during the initial stages tend to be stagnant in case of an emergency occurring that might require more capital to be injected into the business to resolve the business's challenges (Putri et al., 2019; López et al., 2019). All new ventures need to be fully supported financially for them to grow and attain market success. Failure to fund new companies adequately will lead to mismanagement of the available resources, which is an indicator of imminent business collapse (Du, Yalcinkaya, & Bstieler, 2016; Farinha et al., 2017). What generally becomes noticeable is that the available resources become overstretched to fill the company's several gaps, making poor returns on the investments made, thus running at a loss. Limited access to resources eventually leads to negative financial performance (Putri et al., 2019).

In contrast, adequate finances within any business make operations run smoothly, ensuring that the strategies laid down are effectively applied to achieve the set objectives (Du et al., 2016; Farinha et al., 2017). A positive financial performance is then achieved when such a business has adequate resources to run its operations. It is recommended that a return on investment should be attractive and consistent before any plans of expanding a business are made, especially in the startup context (Du et al., 2016; Farinha et al., 2017; Alghatani, 2020). Accordingly, any organisation's financial performance will entirely depend on the available resources that have been set aside for the running of the venture for an entire financial year. However, as stated earlier, the use of the financial performance as a measure of a startup's organisational performance is extremely challenging (Farinha et al., 2017; Alghatani, 2020). Researchers have most recently suggested a measurement metric where the financial reduction in costs in comparison to other startups in the same industry has proven a more useful measure of performance (Du et al., 2016; Farinha et al., 2017; Putri et al., 2019; Alghatani, 2020). Venture capitalists in the space in recent years have employed diverse financial measurement techniques, methods and principles to better understand the likelihood of growth and success for startup organisations in their early stages of development (Martens et al., 2016; Farinha et al., 2017; Alghatani, 2020).

Understanding the financial health and performance through this more modern lens in some way assists organisations looking to establish a competitive advantage over other businesses in the same industry (Putri et al., 2019; Alghatani, 2020). Finding ways to measure this sort of financial performance and understanding what drives it forms a vital part in not only helping startups and venture capitalists understand startup overall performance better, but also contributes to the overall literature on organisational performance. Startup ventures must embrace innovative financial measures of performance, should firms desire to expand and enhance returns on their assets and investments (Martens et al., 2016; Farinha et al., 2017; López et al., 2019; Alghatani, 2020).

5.6.3 Market performance in organisational performance literature

The opportunity to capture a target market and gain a stronghold or share of a market in any given industry is what drives businesses, even in cases where startups lack adequate funding to drive growth and sustained expansion into these markets (Teece et al., 1997; Hussinger, 2010; Boso et al., 2013; Tuluce & Yurtkur, 2015; Teece, 2018; Alghatani, 2020). Any startup business looking to increase sales and boost revenue must ensure that market readiness and availability exist for their products and services, at the very least if they are looking to keep the business afloat for the foreseeable future (Boso et al., 2013; Ho & Odhiambo, 2015; Teece, 2018). Market performance can be defined as the effectiveness of a business's marketing and acquisition strategies concerning its market-related objectives (Boso et al., 2013; Ho & Odhiambo, 2015). Consequently, there is a difference between market performance and product market performance, where the latter focuses entirely on the performance of the products of the organisation in a specific market as opposed to the performance of the company as a whole (Ho & Odhiambo, 2015). The latter, which forms part of organisational performance in the tech startup context, focuses on market-related objectives including increased active user growth, competitor entrants, increased market share, and increased revenue. These four metrics represent the goals set by startups in relation to market performance (Martín-Rojas et al., 2015; Martín-Rojas et al., 2016; Alghatani, 2020).

An increase in active users and sales implies improved user engagement and appetite and consequently positive market performance. Researchers argue that it serves as an indication that consumers have embraced the new disruptive product and are satisfied with it, hence the increased interaction and robustness of the product and/or service (López et al. 2019; Alghatani, 2020). Also, an increment in revenue collection illustrates a positive market performance, which implies a broader market share increase relative to its competitors in the space. Furthermore, businesses with a complementary market performance often encounter less competition due to either the superior quality of their disruptive product innovation or favourable and often cheaper and more affordable alternative (Ho & Odhiambo, 2015; López et al. 2019; Alghatani, 2020). On the other hand, a reduction in active users, sales, market share, and revenue often implies a negative market performance.

Besides, Ho and Odhiambo (2015) argue that market performance is a tool to measure how effectively consumers embrace new products as a measure of overall organisational performance. Based on this argument, market performance is effectively measured by understanding whether the product's market share has risen and helped boost its overall business performance target. It is not new that for well-established organisations market performance is best reflected at the end period of the set goals and objectives, but this is often complex to ascertain in startup businesses as the driving force behind

what makes some startups succeed and others fail is presently ambiguous and unclear at worst, and anecdotal and oversimplified at best (Martín-Rojas et al., 2015; Martín-Rojas et al., 2016; Alghatani, 2020).

In the analysis to determine the market performance of any startup, some researchers argue that specific policies should be considered, such as the output, production efficiency, and the relationship between selling price and costs, but these are factors largely driven by scale and operational efficiencies, something often lacking in firms in the early stages of development (Martín-Rojas et al., 2015; Martín-Rojas et al., 2016; Alghatani, 2020). However, some researchers have argued that new businesses should endeavour to set aside adequate resources where possible, to explicitly create awareness around new products and services available to consumers through innovative advertising and marketing initiatives (Ho & Odhiambo, 2015; Ho & Odhiambo, 2015). The intention is thus to target consumers, educating them more about the product's specific benefits and unique selling points in comparison to other competitive products in the space. For instance, researchers argue that a startup venture with a novel product ready to be launched into the market should first make their target consumers aware of their product and/or service and why they should embrace it over other competing products (Padula et al., 2015; Patel, Kohtamäki, Parida, & Wincent, 2015; Schuster & Rueck, 2017; Sekliuckiene & Sedziniauskiene, 2019). It becomes exponentially easier to introduce and market the brand of the business to consumers thereafter.

Research has proved that a well marketed organisation that grows organically or grows through sustained marketing related activities struggles considerably less than those that do not, while trying to gain increased market share and perform overall (Padula et al., 2015; Patel et al., 2015; Schuster & Rueck, 2017; Sekliuckiene & Sedziniauskiene, 2019). Therefore, it is vital for startup ventures to understand what elements to foster for growing their brand, driving adoptions, and helping the business achieve its set goals and objectives. Organisational performance is heavily dependent on market performance as it plays a vital role in the growth and development of companies in their early stages of development and is therefore an essential component of the overall organisational performance of the business (Sekliuckiene & Sedziniauskiene, 2019; Alghatani, 2020).

5.6.4 Shareholder value performance in organisational performance literature

The success, expansion and failure of any business is largely dependent on its shareholders as they are the primary source of financial injection into any organisation. The value of shareholders dramatically determines the longevity of a startup business. According to Knauer, Silge, and Sommer (2018), shareholder value, also known as the shareholder value model, refers to the total amount that is remitted to the equity owners of any business as a result of the management’s ability to enhance cash

flow, increase customer acquisition, increase sales, and enhance revenue collected. All these are aimed at improving both the income and dividends due to shareholders of any organisation. For instance, if a business is backed financially or intellectually by stable stakeholders, the production rate and quality of production will increase, leading to an increase in customer acquisition and business sales (Knauer et al., 2018; Alghatani, 2020). Through improved shareholder performance dividend pay-outs, there is often an increased desire to invest more funds into the business and consequently improve the firm's chances of improved overall performance, as these funds are often used to expand and grow the business in new markets (Kim, 2016; Gnekpe & Coeurderoy, 2017; Linton & Kask, 2017; Lau & Lo, 2019).

Globally, stakeholders are always attracted to companies that will guarantee them a larger return on their investment. It then implies that for a complementary organisational performance to be attained, the stakeholders ought to invest adequately and be assured of a positive return on investment (Knauer et al., 2018; Lau & Lo, 2019; Alghatani, 2020). How then does the stakeholder value performance *truly* improve the overall performance of the organisation? As stated earlier, with any new venture in its initial stages of growth, investors rely heavily on market trend observations and the startup's technological and strategic capabilities before committing to a long-term investment deal; therefore, stakeholders often look at how the venture currently enriches the already present stakeholders of the business. If there is consensus that stakeholder satisfaction is presently being met by the startup, there is a greater willingness to invest (Gnekpe & Coeurderoy, 2017; Linton & Kask, 2017). It is through these investments that startups obtain adequate capital to run all present and future operations successfully. For instance, if an investor is convinced by the returns that will be received at the end of the financial year, a deal will ensure that it will see investments made to run the business operations (Gnekpe & Coeurderoy, 2017; Linton & Kask, 2017; Alghatani, 2020).

Besides, stakeholder performance valuation exists to illustrate the market capitalisation of any business by approximating the company's future potential capital. Researchers argue that stakeholder value is a crucial measure of their return on investment, hence impacting any business that needs investors for their increased competitive advantage. Furthermore, many researchers have advocated for stakeholder value to be embraced as a top priority for both new and already existing businesses (Knauer et al., 2018). For startup businesses, founders should have realistic plans that will convince the investors that the stakeholder's value is as important as improved customer satisfaction and increased product sales.

Therefore, stakeholder value acts as an attractive aspect for investors and should be a priority in all organisations. Prior studies have proved that stakeholder value stimulates the profitability of a

business regardless of its stage of development and industry. Although it is unclear what drives the entrepreneurial mindset and innovation capabilities of individuals working in startups, placing vital importance on stakeholder performance will have an overall positive effect on the performance of any startup organisation. The more entrepreneurially driven and innovative a startup is, the greater its chances of satisfying its stakeholders and consequently the greater its chances of performing and succeeding (Ganzer et al., 2017; Teece, 2018; Knauer et al., 2018).

It is indisputable that researchers over the years have argued that stakeholder value directly impacts on organisational performance. In other words, the more appealing the stakeholder value, the more profitable the business, while the less attractive the stakeholder value, the less fortunate a company becomes (Knauer et al., 2018; Gnekpe & Coeurderoy, 2017; Alghatani, 2020).

In summary, the literature suggests that a comprehensive capabilities-based view of organisational performance relies on the outcomes of financial performance, shareholder value performance, and market performance—a failure to drive any of the three in any startup organisation will often lead to a negative effect on the business's overall performance. However, what drives the mindset in these startups to foster entrepreneurship, innovation and consequently performance is unclear. Linking entrepreneurial orientation and performance and linking innovation and performance are well known, but what exactly to foster to drive a combination of both innovation and entrepreneurship as precursor of organisational performance is largely unknown. Being able to identify a comprehensive set of dynamic capabilities will give startups a better idea of the elements to focus on for organisational performance.

5.7 CONCEPTUAL FRAMEWORK FOR THE STUDY

This section reviews the dynamic capabilities theory and reviews literature on the effects of capabilities-based approaches for achieving a greater understanding of drivers of tech startup performance. It reviews the comprehensive capabilities-based theory, also known as the dynamic capabilities theory, which will provide a framework for the discussions of the constructs employed in this study – discussed in this chapter and in Chapters 6, 7 and 8 to follow.

Models used by researchers to describe what drives innovation diffusion in tech startups are discussed, including the acceptance model, the chocolate model, the innovation model, and concerns-based adoption models. The review of literature on the effects on these capabilities-based models on conceptual understanding show inconsistencies in achieving improved tech startup performance and these are discussed. This section also reviews types of innovation capabilities with a view to suggest a

proposed measure innovation that may have a more positive influence on achieving tech startup performance.

5.7.1 Dynamic capabilities-based theory as a framework

The conceptual framework for this study was derived from Teece's (2007) SST (Sense, Seize, Transform) dynamic capabilities model for transforming complex business problems in high-tech businesses. Dynamic capabilities are a comprehensive capabilities-based framework, as discussed in the sections above, that include the sensing, seizing, and transforming components needed to design and implement effective startup procedures that can have real impact for tech startups in practice (Teece, 2018). They assist an enterprise to improve its higher order and secondary order capabilities and direct these, and the capabilities of individuals in these startups, toward lucrative business endeavours (Martin-Rojas et al., 2015; Ganzer at al., 2017).

This entails developing and harmonising the enterprise's and individual resources innovatively to tackle and even structure changes in the marketplace and the business environment in general. The quality of a firm's dynamic capabilities controls the pace and extent (and associated cost) of aligning the firm's resources, including its new product and service ideas, with customer needs and desires (Singh et al., 2019). To achieve favourable business outcomes in high-tech environments, startups must be able to constantly sense opportunities through the development of certain capabilities that can strengthen the firm's ability to seize and transform opportunities (as the market or business problem demands) that may help firms tackle complex business problems, threats, and opportunities as they appear.

Before we focus on drivers, innovation capabilities or entrepreneurial orientation within the context of driving certain internal variables to foster tech startup performance, it is important to understand the epistemology of the concept; firstly, to understand the origin of capabilities alone, and then specifically to understand how this study sought to use a dynamic capabilities-based approach to foster tech startup development conceptually.

Capabilities are generally described as the ability to assume activities; they are dormant until used and exploited (Gremme & Wohlgemuth, 2017). Therefore, dynamic capability or comprehensive capabilities can be defined as the natural capability of an organisation to adapt and combine its available resources to solve complex business challenges (Teece, 2018) comfortably and objectively. The entire idea of dynamic or comprehensive capabilities was an upgrade of the earlier concepts of operational capabilities (Teece, 2013; Teece, 2014; Teece, 2018). The difference between the two is that operational capabilities entailed the effectiveness of an organisation in efficiently responding to

any changes of operations, whereas dynamic capabilities entail a combination of different types of capabilities, some acquired and some innate to the organisation (Anyawu, 2016; Teece, 2018). The primary assumption regarding this concept is that the elementary individual capabilities of an organisation ought to produce short-term competitive strengths that can in turn be moulded and combined into the future through long-term competitive advantage. As a result, the concept foregrounds the resource-based view, which involves the competitive advantage of an organisation based on innovative combination of the available resources to produce a favourable outcome. Despite focusing on similar objectives, a dynamic capability-based view is more about how an organisation can survive the current market by reinventing itself and making continuous changes to fit the market demands in new ways (Wójcik, 2015).

There are capabilities pertinent to certain firms that are developed over a specific period through continued learning, giving enterprises the ability to exploit opportunities in a resourceful manner and at the very least through a reasonable basic approach (Gremme & Wohlgemuth, 2017). A firm's organisational capabilities can be perceived as a meta-routine. Within tech startups, when leaders across the organisation decide to back routine, they do so by establishing critical methods through a combination of effective communication and effective knowledge distribution (Wójcik, 2015).

This theory therefore suggests that individuals in the right context possess certain attributes peculiar to them, a combination of a number of capabilities made possible by fostering human capital, social network capital, plus cognisance which enables individuals within these firms to exhibit entrepreneurial and innovative traits required to grow and succeed. Consequently, it implies that the repetition of certain activities over and over foster and underpin capabilities that are then used to achieve certain goals or to execute a number of activities.

The three components that form part of the dynamic capabilities conceptual framework – sensing, seizing and transforming – are discussed in the section below.

Sensing

This ability can be conceptualised as the capability of the tech startup to identify new opportunities, scan the startup atmosphere, examine internal processes that need improving and evaluate the leadership's ability to achieve a superior competitive position (Teece, 2018). Building the capabilities required to sense the changes required in a startup does not mean they are capable of exploiting those opportunities and responding appropriately (Anyawu, 2016; Teece, 2018; Singh et al., 2019). This study is premised on precisely this knowledge gap. Research evidence suggests that tech startups must

develop the ability to reshape their resource capability by sensing the changes in the business atmosphere effectively to tackle them adequately (Martin-Rojas et al., 2015). If a tech startup can be responsive to the changes of the environment, including building its management capabilities to study the competition, it gives itself a chance to redefine the market positively (Ganzer et al., 2017). Also, the use of a tech startup's technological competence becomes crucial in sensing new opportunities that may lead to the redefining of a disruptive mindset needed to renew the product portfolio.

Seizing

This ability can be conceptualised as the capability of the tech startup to examine new opportunities, exploit the opportunities in the business environment, and make bold novel moves internally in preparation for change (Anyawu, 2016; Teece, 2018; Singh et al., 2019). Seizing is described as the capability required in tech startups to think outside the box and provide disruptive approaches to taking advantage of novel opportunities as they arise (Anyawu, 2016; Teece, 2018; Singh et al., 2019). This capability focuses on driving a change in orientation and resources, gearing them not merely to sense but to proactively control a previously untapped market. If a firm can proactively respond to changes and take on risks where competitors are too complacent, this is described by Teece (2018) as a tech startup's ability to seize. Capabilities must be developed to ensure individuals in these tech startups are working efficiently to exploit even that which is operationally successful in light of a long-term view to remain sustainable (Anyawu, 2016).

Transforming

This ability can be conceptualised as the capability of the firm to create new products and processes, build new capabilities competitors have not thought of before, and use the capabilities developed in the sensing and seizing phases to create tangible change for customers. It is one thing for a firm to sense opportunities but exploiting them (seizing) and creating change (transforming) are capabilities that sometimes overlap but go hand in hand (Anyawu, 2016; Teece, 2018; Singh et al., 2019). A tech startup must have the ability to create new avenues out of opportunities identified and exploited. A tech startup competing in dynamic settings must have the capability to drive the delivery of innovative products and services to consumers (Anyawu, 2016). Achieving the capability allows the tech startup to drive productivity and bring changes in the market its competitors are unable to (Anyawu, 2016; Teece, 2018; Singh et al., 2019). This capability focuses the internal resources in the tech startup on doing the things that hurt now to enjoy the benefits in the long term.

Dynamic capabilities theory is the theoretical framework upon which the concept of a comprehensive set of drivers, innovation capabilities and entrepreneurial orientation is built. It denotes a subcategory of capabilities focused on a strategic change in mind-set and consequently output, not only at the tech startup level but also at the specific individual level (Gremme & Wohlgemuth, 2017). Furthermore, dynamic capabilities give startups the enabling environment to generate, spread and transform their ability to grow and survive, including modifications in their resources (palpable and impalpable assets), innovation capabilities, and entrepreneurial orientation in order to scale products, consumers, shared collaborative economies, and other aspects of the business environment outside of their control.

Despite the use of dynamic capabilities by many organisations, it has not evaded opposition from other scholars. According to Babatunde, Perera, and Zhou (2016), dynamic capability theory is vague since it cannot describe exactly how to effectively respond to the changing business environment. Components of the conceptual model are sometimes missing, often ignored and exceedingly difficult to describe (Gremme & Wohlgemuth, 2017). Furthermore, they argue that dynamic capabilities are difficult to discover and implement, and sometimes not tightly predictive (Babatunde et al., 2016; Teece; 2018; Gachanja et al., 2020). Their recommendation is that the theory should be tested further in different studies, in more contexts and settings, to enhance its clarity.

Although facing several oppositions, dynamic capabilities theory has more benefits than limitations. Dynamic capabilities take a comprehensive view of the needs of a business and results in the stability of an organisation, enhances its ability to acquire new skills, and builds up competencies both internally and externally crucial to the firm's identity (Teece, 2007, 2018). It is through such benefits that an organisation competes favourably and survives in a dynamic market. Although sometimes not predictive, if comprehensively developed, dynamic capabilities-based theory does have the ability to give tech startups and their founders a sense of what they need to do to foster success. Though a dearth of information exists about this comprehensive dynamic capabilities-based approach, even more so in developing markets, research evidence suggests that tech startups in Africa may benefit from the use of a comprehensive capabilities-based approach to make their organisations viable in the current market, a gap in knowledge this study sought to fill.

The research evidence seemed to further suggest that the use of this theoretical framework best suits this study as it lends itself to the dynamic nature of high-tech environments riddled with ever changing business and technological landscapes. For instance, firms that rely on a strict, linear mode of production will find it difficult to change to the new technology modes of production at short notice (Yi, 2020).

The theory therefore lends itself to a comprehensive capabilities-based model for the successful fostering of tech startup development. Figure 5.2 below is an illustration of the basic SST (sense, seize & transform) model as suggested by Teece (2007, 2018).

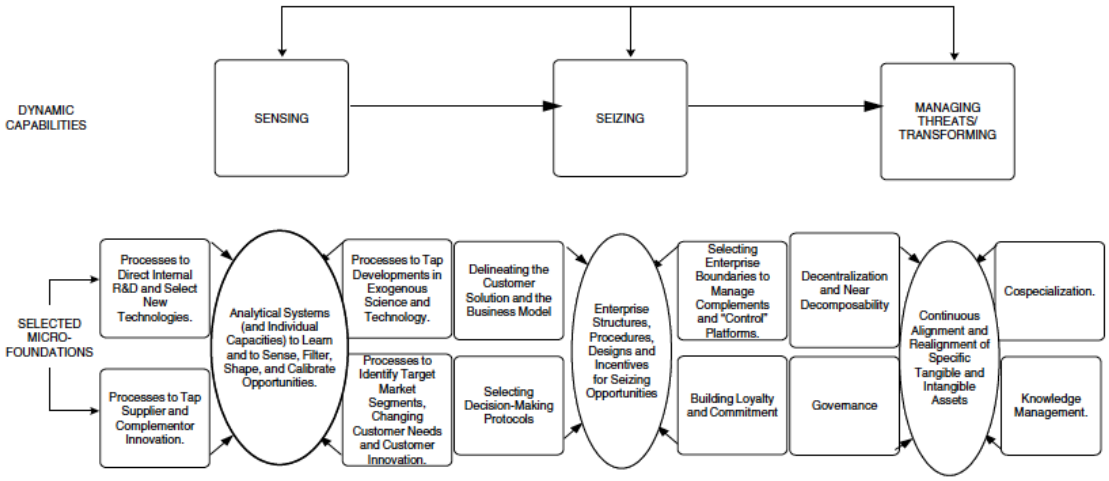


Figure 5.2: Conceptual framework model for the study adapted from Teece's (2007) SST framework

Anyawu (2016) adapted the above model to suggest the class of capabilities tech startups need to foster more specifically in developing markets for driving improved customer value propositions and subsequently gaining a competitive advantage. However, the precise capabilities and combination of dynamic capabilities needed to foster tech startup performance, and what these are specifically, is a gap in both Teece's (2007) Dynamic Capabilities Theory and a gap in Anywau's (2016) adaptation for consumer value proposition and competitive advantage development as shown in Figure 5.3 below. This is a gap this study sought to fill.

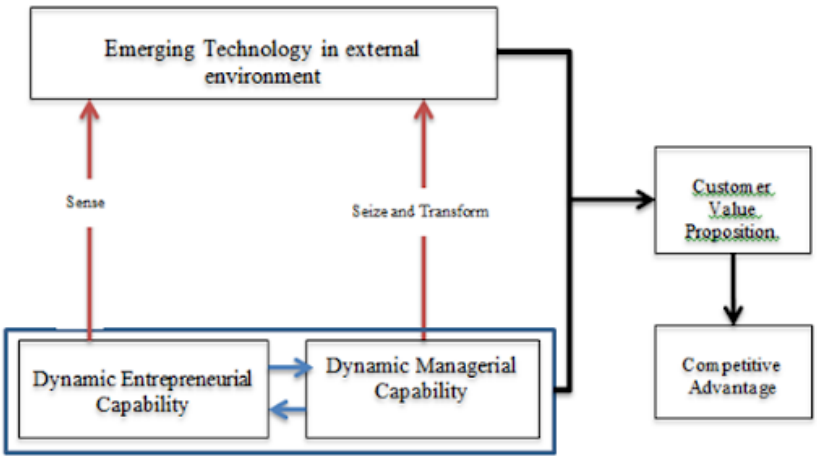


Figure 5.3: Anyawu's (2016) adaptation of Teece's (2007) SST framework

Dynamic capabilities are multi-faceted and multidimensional, and tech startups will not necessarily be proficient across all types (Teece, 2013, 2014, 2018). A startup might excel at sensing new opportunities and building these capabilities but could be relatively weak at identifying capabilities that help them seize and exploit complex business challenges and vice versa (Teece, 2018). This study therefore sought to develop a comprehensive dynamic capabilities-based approach to tech startup performance that provides tech startups with a complete answer on what higher order and secondary order capabilities to foster to drive performance, using Teece's (2018) SST model as a framework.

5.8 HYPOTHESIZED MODEL FOR THIS STUDY

The current body of knowledge has been unable to present a comprehensive dynamic capabilities-based approach to driving tech startup performance as is evident in the literature reviewed in Chapter 2 through to Chapter 5. Research evidence indicates that few studies have explored the combined effect on fostering both entrepreneurial orientation and innovation capabilities as a way of boosting tech startup performance. Furthermore, a comprehensive set of dynamic capabilities deemed necessary to strengthen their effect on performance has had no discussion to date. Our ability to provide a model like this will bring scholars a step closer to answering the question: "Why do many tech startups fail and few succeed?"

The conceptual model used to develop the hypothesised model employed in this study was discussed in section 5.7 above and knowledge gaps were identified in Teece's Dynamic Capabilities Theory that this study sought fill. Therefore, this study proposes a comprehensive capabilities-based framework for fostering tech startup performance. Figure 5.4 below provides a summary of the null hypotheses argued in the previous sections, herewith provided again:

Ho1a: There is no significant influence of top management capabilities on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho1b: There is no significant influence of top management capabilities on the innovation capabilities of startups in the attainment of tech startup performance.

Ho2a: There is no significant influence of technological competence on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho2b: There is no significant influence of technological competence on the innovative capabilities of startups in the attainment of tech startup performance.

Ho3a: There is no significant influence of organisational learning on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho3b: There is no significant influence of organisational learning on the innovative capabilities of startups in the attainment of tech startup performance.

Ho4a: There is no significant influence of entrepreneurial orientation on the performance tech startups.

Ho4b: There is no significant influence of innovative capabilities on the performance of tech startups.

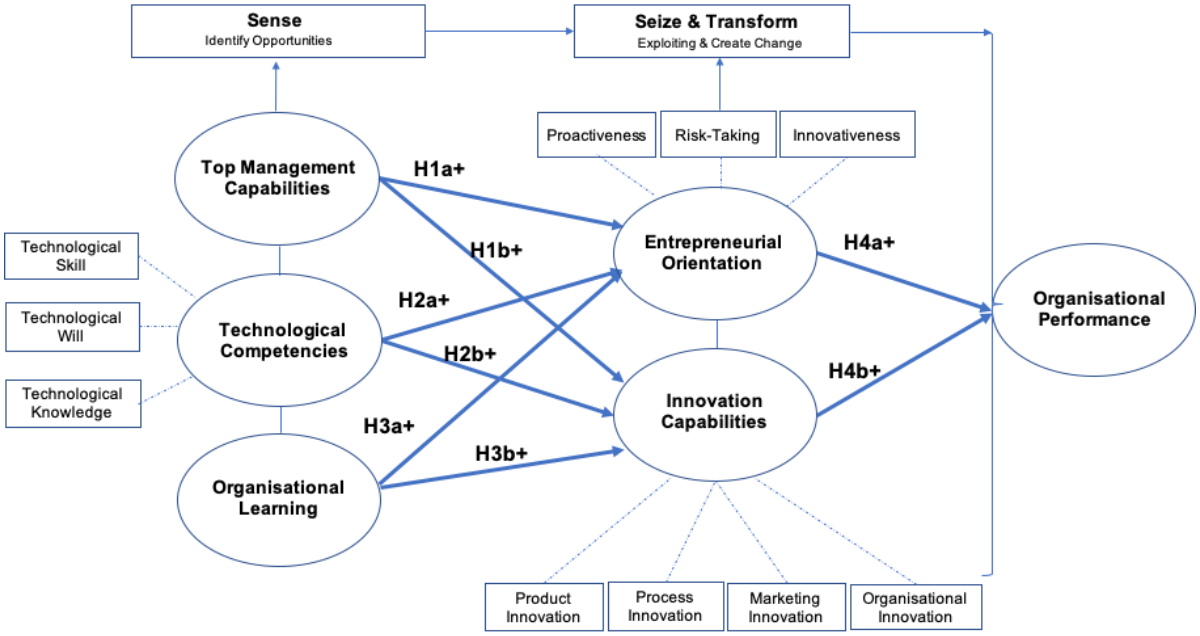


Figure 5.4: Hypothesised model for the study

5.9 CONCLUSION

Dynamic capabilities have increasingly played a pivotal role in the development of business ventures, especially in tech startup organisations whose ability to develop a comprehensive set of capabilities that can foster performance is crucial, and especially for tech startups facing even more complex business environment challenges, such as those on the African continent.

This chapter analysed traditional approaches to performance development in startups and argued the need for comprehensive capabilities-based models for tech startup performance development. The conceptual framework for the study and how it has been adapted to answer the research question stated at the start of the study was also discussed in section 5.7. The use of a comprehensive dynamic

capabilities-based framework as opposed to more traditional approaches to entrepreneurship, innovation and performance was examined and discussed in sections 5.1 to 5.6. This chapter highlighted that driving performance in high-tech settings deals with a multiplicity of multifaceted and complex factors often difficult for scholars to identify. It highlighted that the combined effect of both innovation and entrepreneurship as a capability is a multidimensional concept that embraces a multiplicity of factors. These factors may prove more effective and more illuminating when looked at comprehensively as opposed to individually in relation tech startup performance.

A review of literature on innovation, entrepreneurship, top management capabilities, technological competences, and organisational learning as a framework to foster performance in tech startups can be summarised as follows:

- The literature evidence seems to suggest that using a dynamic capabilities-based approach as opposed to more traditional approaches to tech startup performance development could be effective in fostering tech startup performance, given the dynamic nature of complex technology environments.
- The inclusion of top management capabilities as part of a comprehensive dynamic capabilities-based framework to foster performance in African startups could provide insights for tech startups looking to grow and develop.
- The inclusion of a comprehensive view of technological competence that includes technological skills, technological will and technological knowledge as part of a comprehensive dynamic capabilities-based framework to foster performance in African startups could provide insights for tech startups looking to gain a competitive advantage.
- Though recognising the conflicting theories of learning in both developed and developing contexts, a review of the literature seems to suggest that the development of learning capabilities and its inclusion in a comprehensive capabilities-based approach may yield positive performance results for tech startups. This is on condition that individuals working in these tech startups are incentivised properly, have the infrastructure to measure their goals properly and effectiveness of internal processes are well communicated.
- The benefits of integrating a measure of organisational performance designed to provide real insights for tech startups in comparison to more traditional measures of organisational performance could yield more insights for tech startups looking to grow.
- There is a dearth of information on studies that have effectively utilised and adapted Teece's (2007, 2018) SST Dynamic Capabilities-Based framework. Most studies have either focused only on the "sense" component of the framework in relation to firm performance in isolation

or focused on the seize component of the framework in relation to productivity in isolation. Very few studies have focused on a comprehensive view of capabilities that include the sense, seize, and transform components of this framework in relation to performance. There has been no discussion to date of what these are in relation to the performance of African tech startups.

5.10 ORIENTATION TO THE NEXT CHAPTER

The next chapter will discuss the research design and methodology employed in this study to inform the research results, discussion and conclusions derived from this study.

CHAPTER 6 :

RESEARCH METHODOLOGY

6.1 INTRODUCTION

This chapter presents a discussion of the research design and methodology employed in this study. This research procedure includes a research design, research philosophy, research method, study sample and sampling procedures, and discussion of the research instrument and data analysis procedures. The research ethical considerations and research challenges considered in the study are also discussed.

6.2 RESEARCH QUESTION

The problem statement in section 1.4 above and examined and reviewed in the literature review in Chapter 2 through to Chapter 5 gave rise to the following research question:

> *What is the effectiveness of a comprehensive set of internal dynamic capabilities, namely top management capabilities, technological competence, organisational learning capabilities, entrepreneurial orientation and innovation capabilities on enhancing tech startup performance?*

To answer the above research question, the study put forward a model with the associated hypotheses stated as follows:

Ho1a: There is no significant influence of top management capabilities on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho1b: There is no significant influence of top management capabilities on the innovative capabilities of startups in the attainment of tech startup performance.

Ho2a: There is no significant influence of technological competence on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho2b: There is no significant influence of technological competence on the innovative capabilities of startups in the attainment of tech startup performance.

Ho3a: There is no significant influence of organisational learning on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho3b: There is no significant influence of organisational learning on the innovative capabilities of startups in the attainment of tech startup performance.

Ho4a: There is no significant influence of entrepreneurial orientation on the performance tech startups.

Ho4b: There is no significant influence of innovative capabilities on the performance of tech startups.

The literature review conducted in Chapter 2 through to Chapter 5 portrayed a gap in knowledge and a lack of consensus amongst scholars regarding the main research question this study sought to answer.

The main variables explored were born out of a thorough literature review of drivers identified in other studies that were unable to provide a comprehensive set of dynamic capabilities to answer the stated research question. In answering a stated research question, the overall research inquiry must acknowledge the scope limitations, while ensuring that research validity and reliability are upheld as expected in a research study fastened on a positivistic research paradigm (Yilmaz, 2013; Hair et al., 2017). This study adhered to these guiding principles in answering the above stated research question and its associated hypotheses.

6.3 RESEARCH PHILOSOPHY

The Oxford dictionary describes the concept of philosophy as the knowledge acquisition of the rudimentary nature of knowledge, what we see as real and what actually exists, giving room for the implication of a set of beliefs. Research seeks to comprehensively understand literary materials and knowledge sources to institute facts and derive novel conclusions (Bougie & Sekaran, 2016; Hair et al., 2017).

A study takes on a positivistic worldview when it presupposes its ability to unearth general laws of relationships that are applicable to all, at every point in time, and is employed when the methodology used in a study is of a quantitative nature (Yilmaz, 2013).

6.3.1 Reasons for adopting a positivistic worldview

This study adopted a positivistic worldview approach for evaluation of the importance of the stipulated constructs, as the study followed a purely quantitative research methodology as discussed in sections below. Research studies that embrace a positivistic approach view reality as singular and impartial, as is demonstrated in this study. Research with an interpretivist approach alternatively tends to view reality not as being singular and partial, while social constructionism places the

development of reality on social influence. As a result, this thesis sought to deliberate for a reality proposed by respondents surveyed in the study. The epistemology and ontology of this scientific investigation are further discussed in the quantitative method section below.

6.3.2 Reasons for adopting a pragmatic worldview

Research has shown that though it is crucial for research in the field of management sciences to portray and demonstrate scientific rigour, this cannot be the sole pursuit of any study. It would be very limiting for a study to pursue academic rigour alone, for this could quite simply encumber the quality and credibility of the results of the study when presented to the individuals in charge of making decisions. Therefore, when a study adopts a pragmatic worldview, the knowledge gaps the study seeks to fill should display both scientific and managerial rigour and relevance in a timeous manner.

The concept of pragmatism emphasises perspectives that are tried, tested and reliable, employing a diverse set of approaches, placing further significance on the research problem and question, while at the same time embracing the objectivity and subjectivity of available knowledge (Hair et al., 2017). The questionnaire used in this study was designed in such a way that the quantitative method employed could capture key insights as demonstrated in its use in previous studies. The idea of pragmatism in research upholds the notion that practical experiences should always be considered, experiences including but not limited to the significance of decisions and a problem-solving orientation to real life uncertainties (Creswell, 2002).

6.4 RESEARCH METHOD

A cross-sectional design and a quantitative survey method were employed in this study, given the context. Since other scientific enquiries conducted in this research area have adopted the same research approach, this helped ratify the approach adopted in this study (Martín-Rojas et al., 2013; Berchicci, 2013; Hussinger, 2010; Ganzer et al., 2017; Singh et al., 2019). A research approach could either be classified as cross-sectional or longitudinal. A longitudinal research approach focuses on the repeated observations of a group of research participants over a specified period (Weiten, 2010; Malhotra, 2015). A cross-sectional research approach, in contrast, focuses on a “point-in-time” approach where research participants are witnessed at a single juncture (Weiten, 2010; Malhotra, 2015).

A cross-sectional quantitative research approach was necessary for the study because it was consistent with the nature of the research question stipulated in section 1.5 and section 3.2. A quantitative research approach also provided the advantage of being able to measure the performance and dynamic capabilities of tech startups using measures previously used in similar

studies in tech startup literature, and still be able to present the findings in a concise and economical manner (Singh et al., 2019).

6.4.1 Research design

This study followed a correlational research design. The research sought to investigate the possibility that there exists a relationship or a set of relationships between a comprehensive set of dynamic capabilities and organisational performance. In the collection of primary data, the use of a survey method is quite effective and commonplace when conducting a correlational research analysis (Creswell, 2002; Trochim, 2006). The study therefore employed the use of electronic survey methods proven to be a cost-effective approach to obtain responses from research participants as stipulated in this study (Malhotra, 2015; Creswell, 2002; Trochim, 2006). Another reason this design was selected was its highly apparent anonymity benefits when it comes to gaining access to delicate information from research participants. It was vital to ensure the confidentiality of responses from respondents given the rather delicate nature of the performance data of these startups that are still heavily reliant on the faith and belief of local and international venture capitalists.

Greener (2008) identifies four main types of quantitative research design –descriptive, correlational, quasi-experimental and experimental. The differences between these methods of research relate specifically to the extent to which the researcher designs for control of the variables in the experiment (Greener, 2008; Creswell, 2002). A descriptive research design seeks to uncover connections and relationships between an observed set of variables or a single occurrence. In such a research design, a researcher does not start with a hypothesis but uses a thorough literature review and data collected to massage a set of hypotheses out of the reviewed data.

A correlational design, in contrast, investigates the idea that a set of relationships could exist between a set of variables using an appropriate statistical analysis methodology. It does not seek to determine causality and is often observational with respect to the data collation (Greener, 2008).

A quasi-experimental research design seeks to investigate a causal connection or relationship between two or more variables. In this design the researcher is neither able to allocate groups nor influence the independent variables in any way (Greener, 2008; Creswell, 2002).

Lastly, an experimental design researches a problem in a true scientific approach that seeks to establish a cause and effect connection and relationship amongst a group of variables identified in a study (Greener, 2008).

A research design differs from a research methodology and is often miscommunicated by scholars or the two concepts are used interchangeably. This is unfortunate as these two are distinctly different dimensions of a research study. Table 6.1 below explains the differences.

Table 6.1: Research design and methodology – The difference

	Research Design	Research Methodology
Dimension	Focuses on the type of study being conducted. Focuses on the type of outcomes the study seeks to derive value from. Focuses on the type of research results deemed necessary to sufficiently deal with the research question	Focuses on the entire research process. Focuses on the techniques and apparatuses the study plans to employ while conducting the research study. Focuses on the key singular steps in the research process and the most impartial path to success.
Source	Its point of departure is the approach to answer the stated research question.	Its point of departure is how specific tasks will be executed, how data will be collected, the population, the sampling strategy, etc.

Source: Adapted from Creswell (2002) and Greener (2008)

It is important to express some limitations as highlighted by Dillman (2007) in the use of this kind of survey method in a research study of this nature. Some of these limitations include internet literacy and internet access in various areas in the key countries focused on in this study. However, these limitations were somewhat mitigated in this study as the researcher attempted to focus on tech startups that were all located in highly connected environments with reliable internet coverage. This was done using Fibre, LTE and ADSL coverage of data publicly available on the websites of most internet service providers in the key countries of focus. Another limitation this research study acknowledges and Dillman (2007) highlights, is the unavailability of the researcher to further explain complex questions in the questionnaire. However, all possible efforts were made to ensure the questions were clearly written for ease of comprehension during the pilot phase of the study. The final questionnaire ensured that detailed instructions were communicated, and introductory paragraphs were written at the beginning of each new section to bridge the knowledge gap between respondent comprehension and researcher's absence.

6.4.2 Research method

The entire research approach of this study was purely quantitative. The study employed a post-positivist paradigmatic location, which assumes that certainty is impartial (ontology), knowledge can be proved or disproved (epistemology), and that inquiry is significance free (axiology). Post-positivism was appropriate because the theory in this thesis is not absolute and has differed in emerging and

developed markets and thus does not always hold from the perspectives of human engagements and conduct (Creswell, 2002) giving way to critical realism.

Critical realism, the most used version of post-positivism, argues that there is a truth that exists outside of scholarly thinking, and further acknowledges that all explanations are capable of being erroneous and that theory can be revised (Trochim, 2006). In line with this philosophy, the study acknowledges that complete truth does not exist and thus its aim was to approximate what is real as far as conceivable, by making use of confidence levels where appropriate. Unlike other views of what is deemed real, critical realism acknowledges that the perspectives of scholars are moulded somewhat by cultural familiarities and world observations, which in this setting are all satisfactory for triangulation purposes in an attempt to discover a reality (Trochim, 2006).

Critical realism also acknowledges that though there exists a unique set of researchers (e.g., Archer, 1982; Bhaskar, 1975; Elder-Vass, 2010; Gorski, 2008; Steinmetz, 1993; Vandenberghe, 2015) who support the meta-theoretical position and from whom they also draw their research methodologies, there is no single unitary framework, belief system or approach all scholars in the field of critical realism agree on (Theory Section, 16; Trochim, 2006). The meta-theoretical position assumes that although some commonalities exist, these can sometimes intersect and interchange in complex ways. There is no single feature that would describe the stance of critical realism. Instead, this meta-theoretical position provides a heterogeneous accumulation of variables carved out from somewhat common pools of features (Theory Section, 16; Trochim, 2006). It is important to understand that critical realism is not a version of an empirical schedule; it also is not necessarily a methodology or theory in its truest essence (Theory Section, 16; Trochim, 2006). It is an involuntary meta-theoretical philosophical position created to give an informed account of science and social science that provides clarity during investigations for empirical evidence. Critical realism concerns itself with the nature of interconnection, intervention, organisation, and affairs, and the indirect or direct ontological practices studies plan to employ (Theory Section, 16; Trochim, 2006).

However, the thread that unites the commonalities that exist between the theoretical and philosophical positions around concepts is the researcher's desire to build a succinct and critical post-positivist philosophy, one that was employed in the study (Theory Section, 16; Trochim, 2006).

6.5 STUDY VARIABLES

Table 6.2 shows the variables that were addressed in the study.

Table 6.2: Study variables

No.	Type of Variables	Variables
1.	Independent variables	1. Top Management Capabilities 2. Technological Competence 3. Organisational Learning Capabilities
2.	Intervening variables	1. Entrepreneurial Orientation 2. Innovation Capabilities
3.	Dependent variables	1. Organisational Performance

6.6 POPULATION AND SAMPLING PROCEDURES

The cost of conducting a survey on an entire population is often impractical and not inexpensive. Therefore, once researchers can identify their target population either loosely or accurately, they make use of a small sample of the target population as respondents for a research study. A sample can be described as subgroup of a larger population chosen for participation in a scientific enquiry (Malhotra, 2015). The aim is to gather data from the sample surveyed and analyse it in such a way that inferences about the larger population as whole can be made.

The sampling design of a study consists of five key steps. The first four of these are to define the target population of the study, followed by the sampling frame, sampling technique and sample size. The last step is to ensure that the process explained in the four steps is succinctly executed (Malhotra, 2015). The section below details the steps of the sampling design by defining the target population, examining the sampling frame, expounding on the sampling technique, and discussing the sampling size employed in the study.

6.6.1 Target population

The population for this study consisted of individuals between the ages of 18 and 65 working for tech startups within the geographical area of the African continent, specifically in South Africa, Nigeria, Kenya, and Ghana. For this study, these organisations were specifically selected due to the increasing global interest in studying technological strategic approaches in relation to the concept of entrepreneurship in sectors and industries with really high levels of internal technological integrations. Enterprises were selected whose organisation key objectives were primarily based on delivering a product or service using digital mediums. There is no consensus on an accurate population of tech startups across Africa, with different sources giving vastly different estimations of the size of this population (Liquid Telecom, 2017; PWC, 2019). Other than these assumed numbers of high technology

ventures that are highly unreliable, no trustworthy sources were identified to help estimate the population of African tech startups who have been in existence long enough to have led large enough teams to success.

High technology firms like tech startup organisations or businesses that deliver a product/service primarily through a digital medium in Africa have been described by researchers as potential vessels for transmitting knowledge from the educational sectors to the commerce sectors and are considered crucial for the strategic growth of economies (Pakura, 2020). Drawing on the researcher's strong social networks from years working in the African tech startup scene and help from industry experts and startup founders, a potential list of qualifying individuals working in tech startups across Africa was obtained. The researcher placed significant emphasis on gathering responses from senior executives and CEOs. More importantly, founders and executives in startup organisations are indispensable sources of assessing and shaping the other technological strategic variables employed in this study. They do this by defining the kinds of behaviours anticipated from individuals in the firm.

A fundamental research source for this study stemmed from a study conducted by Martín-Rojas et al. (2013), who also investigated organisational technology drivers and chose to select high-tech, knowledge-driven organisations for reasons stated below:

- Tech startups employ highly technical employees like software engineers, design directors, research and developments experts, marketing experts and technology and innovation senior managers.
- Tech startups constitute a developing portion of the budding business population across Africa, especially in these key countries, and add tremendously to socio-economic upliftment.
- In comparison to other business industries or sectors, high-tech knowledge driven firms possess an untouchable, heterogeneous and expiable nature and a desire to make constant, small changes quite iteratively, thereby adding increased value to their existing products and making understanding what drives employees innovation capabilities so crucial.
- Tech startups are ambitious businesses that place a significant emphasis on building products and/or services where the knowledge needed to execute is routinely deposited in the minds of employees.

The unavailbality of an accurate target population of tech startups across the continent made the use of a probability sampling technqiue unreasonable and impractical. The amount of effort involved in

attempting to employ a probability sample was the reason a non-probability sampling technquie was selected for this study, as discussed in the section below.

6.6.2 Sampling frame

The sampling frame represents the elements of the target population and includes a set of characteristics that assist the researcher in the selection of the target population he/she seeks to survey. This frame is identified by answering two key questions: who needs to be investigated for the intended research question to be answered, and secondly, how does one gain access to the sampling frame. The target set of individuals needed to answer the research question stated in section 6.2 are individuals who are presently or have in recent times been responsible in these startups for technology development in tech startups across the key African countries of focus in this study.

They needed to have:

- Worked in tech startups defined as startups whose mode of delivering products or services to customers is primarily via the internet or some digital medium.
- Worked in tech startups across the key countries of focus in this study namely Kenya, South Africa, Nigeria and Ghana.

To control for sampling frame error, this study included filter questions in the survey questionnaire to remove responses from respondents who did not fit the criteria of the target population discussed in section 6.6.1 above.

6.6.3 Accessing the sampling frame

Some information of CEOs of top tech startups on the African continent are freely available online. Through the researcher's extensive years in the industry, the contact details of many CEOs in this space were within the researcher's immediate social network. For those that were not available, contact details were available on professional social media platforms such as LinkedIn, which were employed in this study. Individuals working in these tech startups would require formal invitations to their firms, requesting participation from the researcher for them to participate in the study. An electronic version of this letter was created and placed at the start of the electronic survey to ensure transparency and consent was given before commencing with the survey. This consent letter was drafted, modified and approved by the university indicating details of precisely what individuals working in these startups would be consenting to once they agreed to participate in the study.

The letter outlined issues pertaining to the purpose of the study, possible risks and benefits of the study, data security and privacy, as well as rights of research participants. This consent letter was first

shared at the beginning of the pilot survey with 15 to 20 individual startups (3 to 4 per country) before data collection commenced. The researcher ensured that the electronic survey was developed in such a way that access was only granted to the participant post electronically signing the consent letter. The individual consent at the start of the research questionnaire ensured that participants acknowledged and adhered to the rules of participation in this research study.

Table 6.3 below shows several events where the researcher had initially planned, through personal attendance, to target CEOs and founders who run organisations that could potentially participate in the study. The events were intended to give the researcher a larger sampling frame. Some of these events moved to digital platforms like Zoom due to social distance regulations placed at venues because of the COVID-19 corona virus pandemic. The researcher ensured that every effort was made to attend these online sessions as an additional method of procuring more responses for the survey, should the efforts made using LinkedIn and other online social media networks be insufficient

Table 6.3: Source of potential respondents

Sources	Explained
Africa Com, 2020	An exhibition event of startups across Africa dedicated to AI, IoT, blockchain, fintech, health tech, cloud, data centres and other innovative digital technologies.
Mobile West Africa, 2020	The regional mobile technology event intended to connect mobile technology leaders in the Nigerian and West African markets.
Founders Factor Africa	An accelerator and incubator created to transform Africa's startup economy by designing scalable high-tech firms.
22 on Sloane | Powering the next generation of entrepreneurs	The largest tech startup campus in Africa created to help small businesses scale.
Discop Africa, 2020	Numerous media tech startups attend this conference every year.
Social Media Week, Lagos 2020	The largest social media event in Africa, attended by members of some of Africa's most digitally innovative startups.
African Women in Technology Kenya #AWITKenya20	The main focus is to educate young African women interested in technology and create collaborative platforms for small businesses to learn, connect and grow.
Tech in Ghana Conference	Created to showcase Ghana's technology ecosystem for inclusive networking, and market relevant product innovation.

6.6.4 Sampling technique

Quota sampling was employed in this study as the most relevant and appropriate sampling strategy for this research inquiry. Quota sampling is a non-probability sampling technique that considers an entire population and then seeks to divide this population into quotas based on data collated from a homogeneous group via a two-step process where two variables are employed to filter information from the population (Hair et al., 2017). Quota sampling is a highly effective sampling approach to employ when conducting a research study of this kind. For the population, this study drew on the four different countries of focus as quotas as well as the respondents' level in the organisation.

Also, probability sampling in contrast would have required a very specific definition of the target population and sampling frame before it could be used in a study. Given the dearth of information on African tech startups and sampling frames not well specified, it ratified the study's use of a non-probability sampling technique known as quota sampling.

When deciding on the sampling technique it is crucial for the researcher to also identify whether the sampling technique will be conducted with or without replacement (Malhotra, 2015). The researcher needs to decide whether an element may be introduced into a sample more than once and is based on the research design selected. Since this study was a cross-sectional correlational research design and not longitudinal in nature, information from the sample only needed to be gathered once, thus allowing the study to make use of quota sampling without replacement.

6.6.5 Sample size

The last step of the sampling procedure is to identify the sample size which is described as determining the number of respondents to include in your study (Malhotra, 2015). The minimum sample size required for a research of this design is 200 respondents, according to Malhotra (2015). Research evidence in previous studies that employed Teece's SST model of dynamic capabilities to survey startups and senior managers made use of a minimum sample size of 200 (Ganzer et al., 2017; Teece, 2018). A pilot study was conducted on 21 individuals initially to test the validity and reliability of the instrument employed in the final study and the final survey used a sample size of 254 respondents as required.

The researcher incentivised CEOs via his social networks to share the information needed for this study by assuring them directly through calls, emails, and instant messages that data used in the study would be treated as confidential and only aggregated insights would be shared.

6.6.6 Sampling bias

The concept of sampling bias arises when there exists a kind of misrepresentation of the respondents within a sample when individuals in a sampling frame have virtually no chance of being included in the sample during the selection process (Hair et al., 2017). The study planned to send surveys out between 1 June 2020 and 15 June 2020 and all answers to questionnaires received by 30 August 2020 were stored and included in the study. The sample did not indicate any bias that the researcher needed to worry about.

6.7 MEASUREMENT INSTRUMENT

When embracing a research design that involves a methodological survey approach to collecting data, the researcher is required to construct a questionnaire, decide on a targeted sample and sampling method, and stipulate how he/she plans to collect the data (Hair et al., 2017). This study thus chose to develop a secure online survey instrument, validated and employed by other researchers as stipulated in Table 6.4 and Table 6.5 below. The online survey questionnaire was used to collect participant perceptions from a sample of participants from the population stipulated. Participants were asked questions to respond to a 65-element survey measurement instrument in a Likert-type scale format, from strongly disagree to strongly agree (Creswell, 2002).

6.7.1 Survey measurement instrument

The instrument, designed and developed for use in this study using scales suggested by Byrd and Davidson (2003) and by Ray et al. (2005) and recently by Martín-Rojas et al. (2013) and Deligianni et al. (2019), comprised questions to explain what constitutes a firm's top management capabilities and technological competence. The instrument also comprised questions to explain what constitutes a tech startup's organisational learning capabilities. This portion of the survey questionnaire was based on slight modifications of an existing measurement instrument designed by Aragon-Correa et al. (2008) and Aragón et al. (2007). The instrument further contained questions to explain what constitutes a tech startup's entrepreneurial orientation, as suggested by Miller (1983) and used by several researchers such as Linton and Kask (2017). The last portion of the survey measurement instrument comprised questions to explain what constitutes a firm's integrated innovation capabilities, based on knowledge gained and an instrument designed by Paladino (2007) and used by other researchers, including Chang et al. (2015) and Sok et al. (2013).

Table 6.4: Academic sources of survey instrument

Variable	Authors
Top Management Capability	Martin Rojas et al. (2013). Byrd & Davidson (2003).

	Ray et al. (2005).
Technological Competence	Martin Rojas et al. (2013). Byrd & Davidson (2003). Ray et al. (2005).
Organisational Learning capability	Aragon-Correa et al. (2008). Aragón et al (2007).
Entrepreneurial Orientation	Miller (1983). Linton & Kask in (2017).
Innovation Capabilities	Paladino (2008) Sok et al. (2013). Chang et al. (2015).
Organisational Performance	Tseng et al. (2012)

The table below outlines, in detail, the academic rationalisation for the survey instrument and indicates where only minor changes were made to the survey instrument for clarity and context.

Table 6.5: Academic rationalisation of survey instrument

Source	Rationalisation	Original Items	Adapted Items
		Top Management Support	4 items. 7-point Likert-type scale
Martin Rojas et al. (2013). Byrd & Davidson (2003). Ray et al. (2005).	Reliability Alpha: 0.78. Convergent and discriminatory validities reported.	1. Top management cultivates technology project champions. 2. Top management ensures adequate funding of technology research and development. 3. Top management restructures work processes to leverage technology opportunities in the organisation. 4. Top management facilitates technology transfer throughout the organisation.	1. In general, top management cultivates technology project champions to help implement new technical projects. 2. In general, top management ensures adequate funding of technology research and development. 3. In general, top management restructures work processes to leverage technology opportunities in the organisation. 4. Top management facilitates technology transfer throughout the organisation.
		Technological Competence - Skills	4 items. 7-point Likert-type scale
Autio (2011). Dyrenfurth (1990). Santos et al. (2017). Martin Rojas et al. (2013).	Reliability Alpha: 0.87. Convergent and discriminatory validities reported.	1. Skills are very superior to closest competitors in hardware and operating systems performance. 2. Skills are very superior to closest competitors in business applications software performance. 3. Skills are very superior to closest competitors in	1. In general, the skills of the people in my organisation are superior to our closest competitors in terms of skillsets related to technical operating systems performance. 2. In general, the skills of the people in my organisation are superior to our closest competitors in terms of skillsets related to business applications software performance.

Source	Rationalisation	Original Items	Adapted Items
		communications service efficiency. 4. Skills are very superior to closest competitors in the generation of programming languages.	3. In general, the skills of the people in my organisation are superior to our closest competitors in terms of skillsets related to communications service efficiency. 4. In general, the skills of the people in my organisation are superior to our closest competitors in the application and execution of various software programming languages.

Source	Rationalisation	Original Items	Adapted Items
		Technological Competence - Will	3 items. 7-point Likert-type scale
Autio (2011). Dyrenfruth (1990). Santos et al. (2017). Martin Rojas et al. (2013).	Reliability Alpha: 0.81. Convergent and discriminatory validities reported.	1. A will to obtain the latest information about the status and the progress of science and relevant technologies relevant to your industry. 2. A will to generate advanced technological processes that are superior to your closest competitors. 3. A will to assimilate existing technologies and useful innovations in new ways that are superior to your closest competitors.	1. My organisation has the will to obtain the latest information about the status and the progress of science and relevant technologies relevant to my industry. 2. My organisation has the will to generate advanced technological processes that are superior to my closest competitors. 3. My organisation has the will to assimilate existing technologies and useful innovations in new ways that are superior to my closest competitors.
		Technological Competence - Knowledge	3 items. 7-point Likert-type scale
Autio (2011). Dyrenfruth (1990). Santos et al. (2017). Martin Rojas et al. (2013).	Reliability Alpha: 0.83. Convergent and discriminatory validities reported.	1. Knowledge to attract and retain its qualified scientific-technical staff. 2. Knowledge to dominate, generate or absorb basic and key technologies. 3 Knowledge needed to setup programs oriented to internal development of technological from research & development initiatives, suppliers and/or customers.	1. My organisation has the knowledge to attract and retain its qualified scientific-technical staff. 2. My organisation has the knowledge to dominate, generate or absorb basic and key technologies. 3 My organisation possesses the knowledge needed to set up programs oriented to internal development of technological from research & development initiatives, suppliers and/or customers.
		Organisational Learning Capability	4 items. 7-point Likert-type scale
Aragon-Correa et al. (2008). Martin Rojas et al. (2013).	Reliability Alpha: 0.78. Convergent and discriminatory validities reported.	1. In the last three years my organisation has acquired and shared a lot of new and relevant knowledge that has given us a competitive advantage. 2. In the last three years members in my organisation have acquired some critical capacities and skills that have given the organisation a competitive advantage. 3. In the last three years the organisational improvements have been influenced	1. In the last three years my organisation has acquired and shared a lot of new and relevant knowledge that has given us a competitive advantage. 2. In the last three years members in my organisation have acquired some critical capacities and skills that have given my organisation a competitive advantage. 3. In the last three years the organisational improvements have been influenced fundamentally by new knowledge entering the organisation.

Source	Rationalisation	Original Items	Adapted Items
		fundamentally by new knowledge entering the organisation. 4. In the last three years I would describe my organisation as an organisation that always takes the time out to learn new things.	4. In the last three years I would describe my organisation as an organisation that always takes the time out to learn new things.
		Entrepreneurial Orientation – Risk Taking	3 items. 7-point Likert-type scale
Miller (1983). Linton & Kask (2017). Martin Rojas et al. (2013).	Reliability Alpha: 0.78. Convergent and discriminatory validities reported.	1. In general, the managers in my organisation have a strong appetite for high-risk projects and opportunities (with chances of very high return). 2. In general, the managers in my organisation believe that owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives. 3. In general, when confronted with decision-making situations involving uncertainty, my firm typically adopts an aggressive posture to maximise the probability of exploiting potential opportunities.	1. In general, the managers in my organisation have a strong appetite for high-risk projects and opportunities (with chances of very high return). 2. In general, the managers in my organisation believe that owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives. 3. In general, when confronted with decision-making situations involving uncertainty, my firm typically adopts an aggressive posture to maximise the probability of exploiting potential opportunities.
		Entrepreneurial Orientation - Proactiveness	3 items. 7-point Likert-type scale
Miller (1983). Linton & Kask (2017). Martin Rojas et al. (2013).	Reliability Alpha: 0.80. Convergent and discriminatory validities reported.	1. In general, my firm in comparison with its competitors, typically initiates actions and processes, which competitors then respond to and sometimes follow. 2. In general, my firm in comparison with its competitors, is very often the first business to introduce new product/services, administrative techniques, and operating technologies 3. In general, my firm in comparison with its competitors, has a strong tendency to introduce novel ideas or products into the	1. In general, my firm, in comparison with its competitors, typically initiates actions and processes, which competitors then respond to and sometimes follow. 2. In general, my firm, in comparison with its competitors, is very often the first business to introduce new product/services, administrative techniques, and operating technologies. 3. In general, my firm, in comparison with its competitors, has a strong tendency to introduce novel ideas or products into the market and sometimes into new markets.

Source	Rationalisation	Original Items	Adapted Items
		market and sometimes into new markets.	
		Entrepreneurial Orientation - Innovative	3 items. 7-point Likert-type scale
Miller (1983). Linton & Kask (2017). Martin Rojas et al. (2013).	Reliability Alpha: 0.78. Convergent and discriminatory validities reported.	1. In general, the top managers of my firm constantly favour a strong emphasis on research and development, technological leadership, and small innovations. 2. My firm launched a number of new, cutting-edge lines of products or services in the past 5 years. 3. In general, changes in products or services in my firm have usually been quite dramatic and shocked the market positively in the past 5 years.	1. In general, the top managers of my firm favour a strong emphasis on research and development, technological leadership, and small innovations constantly. 2. My firm launched a number of new, cutting-edge lines of products or services in the past 5 years. 3. In general, changes in products or services in my firm have usually been quite dramatic and shocked the market positively in the past 5 years.
		Innovation Capabilities - Product	6 items. 7-point Likert-type scale
Tseng et al. (2012) Paladino (2008) Sok et al. (2013). Chang et al. (2015).	Reliability Alpha: 0.78. Convergent and discriminatory validities reported.	1. The quality of our new products and services is superior to that of our closest competitors. 2. The product design of our products and services (in terms of functionality and features) is superior to that of our competitors. 3. In general, my organisation has an advantage over its competitors in terms of the new products it offers. 4. In general, changes to our new products and services could be described as major in terms of their improvements in comparison to other competitors in the space. 5. In general, our new products and services incorporate a large body of technological knowledge that is superior to that of our competitors.	1. The quality of our new products and services is superior to that of our closest competitors. 2. The product design of our products and services (in terms of functionality and features) is superior to that of our competitors. 3. In general, my organisation has an advantage over its competitors in terms of the new products it offers. 4. In general, changes to our new products and services could be described as major in terms of their improvements in comparison to other competitors in the space. 5. In general, our new products and services incorporate a large body of technological knowledge that is superior to that of our competitors. 6. In general, the applications of our new products and services are totally different from the applications of our main

Source	Rationalisation	Original Items	Adapted Items
		6. In general, the applications of our new products and services are totally different from the applications of our main competitors' products and services. 7. Improve the firm's relationship with its suppliers.	competitors' products and services.
		Innovation Capabilities - Process	4 items. 7-point Likert-type scale
Tseng et al. (2012) Paladino (2008) Sok et al. (2013). Chang et al. (2015).	Reliability Alpha: 0.89. Convergent and discriminatory validities reported.	1. In general, my organisation is constantly reviewing and improving its business processes. 2. In general, my organisation changes product development methods at a great speed in comparison with its competitors. 3. During the past three years, my company has developed and implemented many new management styles and approaches. 4. In general, when we cannot solve a problem using conventional methods, we improvise using new methods.	1. In general, my organisation is constantly reviewing and improving its business processes. 2. In general, my organisation changes product development methods at a great speed in comparison with its competitors. 3. During the past three years, my company has developed and implemented many new management styles and approaches. 4. In general, when we cannot solve a problem using conventional methods, we improvise using new methods.
		Innovation Capabilities - Marketing	6 items. 7-point Likert-type scale
Tseng et al. (2012) Paladino (2008) Sok et al. (2013). Chang et al. (2015).	Reliability Alpha: 0.95. Convergent and discriminatory validities reported.	1. Our marketing team is constantly improving its campaigns and messaging to stay ahead of the market. 2. Our marketing team tries to find new and exciting ways to build and improve relationships with our customers. 3. Our marketing and sales techniques are always revised, and we are always trying to find new methods of promoting our products and services to our customers. 4. Our marketing team does not only conceptualise our	1. Our marketing team is constantly improving its campaigns and messaging to stay ahead of the market. 2. Our marketing team tries to find new and exciting ways to build and improve relationships with our customers. 3. Our marketing and sales techniques are always revised, and we are always trying to find new methods of promoting our products and services to our customers. 4. Our marketing team does not only conceptualise our marketing ideas, but we also implement new

Source	Rationalisation	Original Items	Adapted Items
		marketing ideas, but we also implement new and innovative marketing initiatives. 5. Our marketing team is constantly looking for new and creative ways to communicate and position the firm's products and services 6. Our marketing team is constantly looking for new and creative ways to improve the firm's relationship with its suppliers	and innovative marketing initiatives. 5. Our marketing team is constantly looking for new and creative ways to communicate and position the firm's products and services 6. Our marketing team is constantly looking for new and creative ways to improve the firm's relationship with its suppliers.
		Innovation Capabilities - Organisational	5 items. 7-point Likert-type scale
Tseng et al. (2012) Paladino (2008) Sok et al. (2013). Chang et al. (2015).	Reliability Alpha: 0.95. Convergent and discriminatory validities reported.	1. My entire organisation is constantly innovating and discovering with new opportunities to exploit. 2. My entire organisation is constantly developing and executing new behaviours and innovative ways of working. 3. My organisation is constantly innovating and coming up with new products and/or services to launch. 4. My organisation is constantly innovating and embracing new technologies. 5. My organisation is constantly innovating and coming up with new administrative practices to utilise, develop and execute.	1. My entire organisation is constantly innovating and discovering with new opportunities to exploit. 2. My entire organisation is constantly developing and executing new behaviours and innovative ways of working. 3. My entire organisation is constantly innovating and coming up with new products and/or services to launch. 4. My entire organisation, is constantly innovating and embracing new technologies. 5. My entire organisation, is constantly innovating and coming up with new administrative practices to develop, utilise and execute.
		Organisational Performance	5 items. 7-point Likert-type scale
Tseng et al. (2012)	Reliability Alpha: 0.88. Convergent and discriminatory validities reported.	1. My organisation's performance measured by return on assets (economic profitability) has been superior to that of its main competitors. 2. My organisation's performance measured by return on equity (financial profitability) has been superior to that of its main competitors.	1. My organisation's performance measured by user/customer growth has been superior to that of its main competitors. 2. My organisation's performance measured by financial investment has been superior to that of its main competitors. 3. My organisation's performance measured by revenue has been superior to that of its main competitors.

Source	Rationalisation	Original Items	Adapted Items
		3. My organisation's performance measured by return on sales (percentage of profits over billing volumes) has been superior to that of its main competitors. 4. My organisation's performance measured by customer market share has been superior to that of its main competitors. 5. My organisation's performance measured by sales of its main products and services has been superior to that of its main competitors.	4. My organisation's performance measured by customer market share has been superior to that of its main competitors. 5. My organisation's performance measured by sales of its main products and services has been superior to that of its main competitors.

6.7.2 Questionnaire design and layout

In this research study, a six-part survey instrument was used to gain data from research participants. (please see Appendix A). In putting together the survey, a few parameters were adhered to in conjunction with the research goal and objectives, to ensure the quality of the academic rigour required at this level.

- The questionnaire begins with the title of the dissertation and what the study aims to achieve in the field of research and why their participation is crucial. The questionnaire also encloses the details of the researcher, the consent letter and provides an online link that also explains the parameters of the ethical clearance requirements.
- For clearance at the University of Stellenbosch's ethical committee, the survey instrument needs to adhere to participation guidelines, be voluntary, and uphold confidentiality and anonymity.
- The questionnaire required participants to share biographical and demographical data, such as gender, country, age, a successful startup in comparison to others, level in the organisation (CEO/ senior managers/ middle manager/ junior staff), startup's number of years in the business, and startup sector (fintech/ mediatech/ healthtech/ retailtech / edutech/ other)
- A 7-point Likert-type scale was used for participants to express to what extent they either agreed or disagreed with the statements in the questions in the survey questionnaire. Possible

responses ranged from strongly disagree, through disagree, somewhat disagree, neutral, somewhat agree, agree, to strongly agree.

- The questionnaire ends by thanking research participants for sharing their perspectives on a range of elements captured in the measurement instrument.
- Friends of the researcher were asked to ratify the quality of the questions in the questionnaire and ratify the amount of time needed to complete the entire survey questionnaire.

6.7.3 Ethical considerations

The university required an ethical clearance application by the researcher to ensure consensus and approval were obtained from startup firms and industry experts before the quantitative research phase of the study could be conducted. This ethical clearance was adequate to share survey questionnaires with respondents as the study adopted a quota sampling approach using a quantitative research methodology. The researcher also ensured that individual consent was obtained from respondents right at the beginning of the online questionnaire with options to decline participation if necessary. The instrument used in this study is discussed later in this chapter. All formal and informal communications with organisations ensured that the individual's freedom to participate was never compromised in any way. The tools within which the surveys were administered during both the pilot and main survey phases were contained and stored until the results analysis phase of the study.

6.7.4 Research challenges anticipated

Trying to measure entrepreneurial orientation and innovation as a creative mind-set occurrence does come with its own complexities and difficulties. Science has long been defined as the study of marvels and happenings that one can observe. It also involves the manipulation of behaviours and results that a researcher can observe. While occurrences that happen in a startup environment involve highly creative processes, frequently perpetuated by the startup's most senior official, the CEO, his/her highly creative thought processes can only be evaluated based on what is considered observable (Anderson, Potočnik, & Zhou, 2014; Almonaitiene, 2013).

Owing to this complexity in trying to observe as much as possible of what happens in the minds of creative thinkers, Anderson et al. (2014) suggested consensual assessment as a method of scientific investigation to bridge apparent knowledge gaps in the literature. This implies that individuals who are quite directly involved in the entrepreneurship and innovation process within startups could apply their perceptions to a set of questions that have been well tested to capture the entrepreneurial orientation of a startup and its innovation capabilities (Anderson et al., 2014; Almonaitiene, 2013). The reason, Anderson et al. (2014) argue, is that these subject matter experts are thus able to make

independent judgements on subject matters that sometimes produce results and conclusions that signify potential correlations and relationships unexpectedly well. They suggest that when dealing with particular kinds of subject matter, those who have had prior experience or who currently work in that area are the most knowledgeable about the perks and challenges of each given area (Anderson et al., 2014; Almonaitiene, 2013). The main aim is to find an acceptable level of agreement amongst individual experts with independent judgements in the field, which is normally present, because it allows for the amalgamation of their perceptions for use as measures in the creative thought process (Anderson et al., 2014; Almonaitiene, 2013). It is particularly complex to measure ground-breaking investigations when looking at innovation or entrepreneurial success through the lens of a consensual assessment method because true innovation or pioneering adventures take time (Martín-Rojas et al., 2013).

Non-response and pushback from tech startups to participate in research is a growing concern. Partly due to the highly competitive and pressured environments they operate in, there is sometimes a perception that there is not enough cost-effective time to saddle employees with surveys (Mouton, 2003; Hair et al., 2017). This presents several complexities and challenges for the researcher and the potential of the overall study. However, response rates were always closely scrutinised to ensure swift and effective countermeasures were explored.

6.7.5 Pilot survey

A pilot study was conducted to assess the research approach and techniques employed by the researcher for an indication of whether optimisations and improvements of the final survey were required (Connelly, 2008).

The pilot survey was based on the slight modifications made to some questions to improve comprehension, legibility, and relevance for the selected targeted sample. It is vital for a researcher to test the quality and validity of either a completely new instrument or a slightly modified version of an already existing instrument. The pilot survey stage involves the dissemination of the survey instrument to a limited number of individuals that form part of the targeted population for the eventual main survey (Creswell, 2002; Welman, Kruger, & Mitchell, 2012; Hair et al., 2017). The purpose of conducting this pilot survey was to identify any biases or flaws in the measurement process, such as confusing or unclear questions, abstruse instructions, or time constraints not well thought out. To ratify the survey instrument and to minimise unforeseen events (Hertzog, 2008), the sample survey was released between January and March 2020 to 21 individuals representative of the four African countries in the targeted population: five from Nigeria, six from South Africa, four from Ghana and five from Kenya, in two startups via an email invitation of eligible participants

recommended by current industry experts and colleagues of the researcher. The researcher did not garner descriptive statistics on demographic information of respondents for the pilot phase of the study.

In terms of the sample selected for the pilot study, some researchers argue a general 10% of the proposed number of respondents in the final survey (which in this case would be 45) (Connelly, 2008) is acceptable, while other researchers have argued that it is not that simple, due to the multiplicity of factors that influence survey-based studies (Hertzog, 2008). Yet other researchers argue that 15 to 45 is acceptable to be statistically significant for survey studies with a sample size of 450, 15 being the absolute minimum (Van Belle, 2002).

The researcher chose a pilot sample size of 21 because of the above justification. The researcher was asked to reapply and fulfil certain stipulations before approval for the final survey process was given and the researcher addressed these in the paragraphs above.

The average response time for the pilot survey was 15 minutes and feedback received during the pilot phase of the study from respondents the researcher engaged with were positive. Given that minor adaptions and minor modifications to improve grammar were made to an existing pre-tested questionnaire with acceptable measures of reliability, this pilot survey was done purely as a precautionary step to ensure rigour was applied before commencing with the actual data collection process (Connelly, 2008; Hertzog, 2008). The pilot survey commenced only after the study had been granted ethical clearance by the university's ethics screening committee. Once clearance was granted and data collected, the pilot survey was analysed using Advanced Microsoft Excel, IMP SPSS 20 and the Qualtrics analysis tool to categorise and disregard the test items that were contradictory to the internal consistency requirements of the survey questionnaire (Van Belle, 2002). When conducting the pilot analysis, the scales were found to be reliable and consistent with the following measures employed:

Internal consistency reliability

Cronbach alpha was used to ascertain the internal consistency reliability of the measurement scales for each construct. Each scale surpassed the 0.7 cut-off as required.

Factor loadings

In addition, single factors loaded for each construct, with individual factor loadings surpassing the 0.7 cut-off, apart from one out of the 54 Likert-type scale-based items. After deliberation and taking a

closer look at the dataset, we decided to keep that item as it appeared that one respondent was responsible for the low loading.

6.7.6 Final survey

The data collection method initially approved by the ethics committee required signatures from gatekeepers from each target organisation. However, upon deliberation with the researcher's supervisors, specific organisations were not really required for the purpose of this study as the study focused on any individual who works in an internet-based startup across Africa. Also, given the research challenges experienced by the researcher because of the COVID-19 global pandemic and stipulations by the university for the use of digital mediums for data collection where possible in order to secure responses, there are more practical ways to administer this survey digitally. A Qualtrics online survey was created where individual consent is required at the start of the survey before the survey commences. This consent form was already approved by the ethics committee. This web-based survey questionnaire was employed during the pilot phase of the study with one question missing that needed to be added to the final survey. This filter question was added to the final survey since the use of gatekeepers was no longer viable because of the restrictions brought on for postgraduate research as a result of the current coronavirus pandemic.

Researchers have been encouraged by the university ethics committee to use as many online and digital methods of data gathering as possible. As a result, the pilot survey was modified to include a single filter question to filter out respondents who did not meet the criteria of working in an internet-based startup.

The final survey instrument consisting of 65 survey questions as opposed to 64 initially used during the pilot phase of the study was electronically shared with 450 individuals in the researcher’s professional network using social media profiles like LinkedIn and Facebook. The researcher ensured that the survey contained a filter question as mentioned above, to ensure the survey was distributed only to individuals who were representative of the target population required for this study. The researcher was therefore solely responsible for the distribution of the survey to individuals who worked in internet-based startups across Africa, whose individual consent was given at the start of the online survey before the survey began. This distribution was done by the researcher to professional friends via email and through the researcher’s social media platforms like LinkedIn and made available for completion through a designated URL. Individual consent was required and formed part of both the pilot and final survey. It was placed at the beginning of the survey as stipulated in Appendix A.

The final survey data collection process followed the same online data collection process as the pilot study. Once approval had been given by the USB ethics committee for ethics clearance, the final study could commence.

Furthermore, both the pilot and final survey questionnaires were only accessible via password protected portals as recommended by the USB's Departmental Ethical Screening Committee. The researcher would ensure that all data collected was removed from the online survey server after the study and stored in strongly encrypted environments to avoid theft and misuse of data. The survey adhered to confidentiality standards as indicated by the screening committee.

6.8 DATA COLLECTION AND PROJECT TIMEFRAME

The final survey data collection process followed the same online data collection process as the pilot study. Once approval had been given by the USB ethics committee for ethics clearance, the researcher was granted permission to collect data via electronic survey methods. The documentation for Ethics Approval can be observed in Appendix D. The timeframe and data collection procedures are discussed in the sections below.

6.8.1 Timeframe

Primary data was collected to appropriately support the research objectives. The questionnaire consisting of 65 survey elements was shared electronically on social media platforms, emailed, and converted into a digital format for online completion. The survey was distributed to at least 450 individuals at various levels of tech startups across the African continent. The study targeted individuals working for startup organisations in their early stages of development, whose founders were largely involved and whose primary mode of product and service delivery was via the internet and other digital platforms.

The elements in the questionnaire that will be elaborated on in the sections below were empirically measured by 7-point Likert-type scales ranging from strongly disagree "1" to strongly agree "7" to measure. Concepts examined were an organisation's top-level management's capability (Byrd & Davidson, 2003; Ray et al., 2005), a firm's technological competence (Real et al., 2006), its organisational learning capabilities (Aragón et al., 2007; Aragon-Correa et al., 2008), its entrepreneurial orientation (Miller, 1983; Linton & Kask, 2017), and its innovation capabilities in various forms (Paladino, 2008; Wang & Ahmed, 2004; Desphande, Farley, & Webster, 1993).

6.8.2 Project plan

The project plan below was put together to hold the researcher accountable to different phases of the research study.

Table 6.6: Project Plan

	Area	Deliverable	Start Date	Completion date
1	Phase 1 of research proposal - Proposed area of interest	Document	2018	01 April 2018
2	Finalising the research proposal	Document	2018	01 July 2018
3	Research participant selection	Document	2018	01 August 2018
Chapter 1: Research introduction & rationale		**Draft Chapter**	**2018**	**01 August 2018**
		Revised chapter with supervisor comments		
		Language and editing		
		Final Chapter Submission		01 September 2018
Chapter 2: Literature Review: Top Management Capability as a driver		**Draft Chapter**	**2019**	**01 May 2019**
		Revised chapter with supervisor comments		
		Language and editing		
		Final Chapter Submission		01 June 2019
Chapter 3: Literature Review: Technological Competence as a driver		**Draft Chapter**	**2019**	**01 August 2019**
		Revised chapter with supervisor comments		
		Language and editing		
		Final Chapter Submission		01 September 2019
Chapter 4: Literature Review: Organisational Learning as a driver		**Draft Chapter**	**2019**	**01 November 2019**
		Revised chapter with supervisor comments		
		Language and editing		
		Final Chapter Submission		01 December 2019
	Chapter 5: Literature Review: Entrepreneurship, Innovation & Performance	**Draft Chapter**	**2019**	**01 February 2020**
		Revised chapter with supervisor comments		
		Language and editing		
		Final Chapter Submission		01 March 2020
Chapter 6: Research Design & Methodology		**Draft Chapter**	**2020**	**01 June 2020**

		Gain ethical clearance		15 June 2020
		Collect Data: South Africa		
		Collect Data: Nigeria		
		Collect Data: Kenya		
		Collect Data: Ghana		
		Revised chapter with supervisor comments		
		Language and editing		
		Final Chapter Submission		30 July 2020
Chapter 7: Quantitative Research Results		**Draft Chapter**	**2020**	**01 June 2020**
		Revised chapter with supervisor comments		
		Language and editing		
		Final Chapter Submission		07 September 2020
Chapter 8: Recommendations & conclusions of the study.		**Draft Chapter**	**2020**	**15 September 2020**
		Revised chapter with supervisor comments		
		Language and editing		
Submission of Thesis		**Draft Chapter**	**2020**	**30 March 2021**
		Revised chapter with supervisor comments		
		Language and editing		
		Final Thesis Submission		**01 July 2021**

This helped the coordination and management of various research activities that involved multiple individuals including the researcher's supervisors, data capturing colleagues and technical and statistical research advisors.

6.8.3 Data collection

The complete survey was distributed to a set of individuals in various internet or digital startup organisations across South Africa, Nigeria, Kenya and Ghana over a three-month period starting in June 2020 and these respondents were incentivised to answer the questions honestly since a detailed summary of the results of the research would be shared with these organisations upon completion of the study.

The web-based questionnaire described above targeting only individuals, about 450 in total, who worked in different levels of internet or digital startup organisations across Nigeria, Kenya, Ghana and South Africa was the data collection instrument. The survey questionnaire was only accessible via password protected portals and the researcher ensured that all data collected were removed from

the online survey server post the study and were stored in strongly encrypted environments to avoid theft and misuse of data.

Nigeria, Kenya, Ghana and South Africa were specifically chosen as a research context for this study because, according to an African internet of Things 2017 report commissioned by Liquid Telecom (2017), these countries through their technology hubs are said to harness the most technologically advanced and successful tech startups of the continent over the next decade.

The respondents were compensated for their efforts in completing the survey and assisting in the research process by being provided with the results and outcomes of the research, to assist them in the potential growth of their organisations from a startup phase to a more profitable and established business phase.

Since the suspension of all face-to-face research activity by the USB's Departmental Ethical Screening Committee due to the global COVID-19 pandemic the researcher made available multiple methods for respondents from all target countries to personally contact the researcher for improved clarity about the questionnaire and research process if necessary. This kind of approach is vital so that all participants involved in the research process receive the opportunity to clarify any complex concepts in the distributed survey, especially with face-to-face interactions now no longer possible. A thorough understanding of the constructs that measure a firm's technological top management capability, its technological competence, its organisational learning capabilities, entrepreneurial orientation, and innovation capabilities was needed to ensure the validity and quality of the proposed research. Certain questions were modified slightly during the pilot phase of the study to better explain certain concepts for better understanding and easier comprehension.

6.8.4 Survey distribution and administration

The questionnaire was converted to an online format and made available digitally using the researcher's professional networks attained through LinkedIn, Facebook and other professional digital networking platforms to a sample of individuals from the tech startup industry in the African countries mentioned above. Through the quota sampling approach, WhatsApp, LinkedIn and other digital modes of communication were used to distribute the questionnaire to industry expert friends of the researcher across the four key countries of focus.

The administration of the survey was a joint effort between the researcher, a survey administrative expert of the university and statistical analysis expert recommended by the university. The online tool

employed for the survey administration became a central space for the administrator and researcher to access, disseminate and analyse the validity of the data.

6.8.5 Survey response rate

When survey methods are used to gather data from respondents, the statistics around data that's usable and data that should be discarded is always a primary requirement. The aim of this exercise is to establish the survey response rate which looks at the percentage of responses one can use in a study in comparison to the overall sample after the removal of unusable data (Hair et al., 2017). Acceptable rates of response are in the region of above 18% as suggested by current researchers in management theory, especially in cases where samples are not selected based on probability, as in this instance, in which case response rates lower than this are considered insignificant. Response rates on the online survey platform were closely monitored regularly by the researcher.

6.9 DATA ANALYSIS AND INTERPRETATION

The study always endeavoured to link its data analysis phase of the study to the research question and associated hypotheses stipulated at the start of the scientific inquiry (Hair et al., 2017).

The pilot phase of the study focused on a smaller sample size of individuals with the aim of ratifying the reliability of the questionnaire in the African context and industry selected, even though previous studies had measured its reliability and validity in first-world contexts. The main phase of the study however employed responses from a large group of respondents and therefore followed a data analysis method known as structural equation modelling (SEM).

6.9.1 Descriptive statistics

The descriptive analysis looked at the suitability of the sampled data to the target population stipulated earlier in this study. The study comprised six constructs, namely top management capability, technological competence, organisational learning, entrepreneurial orientation and innovation capabilities and organisational performance, whose mean and standard deviations were analysed to better comprehend central tendencies and spreads.

The study also looked at other descriptive statistics that focused on the frequency, means and standard deviations of the responses from the four countries of focus as well as descriptive statistics around the tech startup's location, age, source of funding, role of individuals in the startup, CEOs highest level of education, CEOs location of education, the experience of individuals working in the startups, their proximity to tech hubs, access to internet and access to electricity. Table 6.7 below summarises the descriptive statistics data collected in this study.

Table 6.7: Descriptive Statistics used in the study

Descriptive Items	Number of items	Descriptive Statistics
Country	4	Frequency, Mean
Age	6	Frequency, Mean
Size of startup	4	Frequency, Mean
Job position in startup	4	Frequency, Mean
Funding source for startup	9	Frequency, Mean
CEO's Level of Education	7	Frequency, Mean
CEO Education Location	3	Frequency, Mean
Prior Startup Experience	2	Frequency, Mean
Close proximity to Tech Hub	2	Frequency, Mean
Access to electricity	2	Frequency, Mean
Internet challenges	2	Frequency, Mean
Electricity challenges	2	Frequency, Mean

6.9.1.1 Realised sample

In quantitative research, descriptive statistics are used to describe the sample in order to determine how closely linked it is to the target population (Malhotra, 2015). Descriptive statistics condense the data obtained in data collection and allow the researcher to summarise the information to decipher any underling meaning. The realised sample in this study consisted of 254 individuals working in tech startups across Africa, demographics of which are discussed alongside response rates in the following chapter. Filter questions were added to the survey during the data collection process to ensure that the sample realised in this study comprised individuals who worked in tech startups and who had experience of building innovative digital products and services. The descriptive details of the realised sample are shown in Table 6.7 above and discussed in detail in the next chapter. The study employed PLS-SEM to analyse the data, which allows for non-parametric data, making it unnecessary for tests of normality of the realised sample to be conducted as a measure of shape for this study. The mean is the most used measure of central tendency and was employed in this study to analyse the realised sample as a measure of location.

6.9.1.2 Demographics

Quantitative research methods suggest descriptive data analysis techniques researchers should employ to organise, present, graph and summarise information succinctly and methodically. As discussed in earlier sections of this study, a demographic snapshot of the technology startups surveyed in this study was collated from the researched sample using descriptive analytic techniques to gain a better understanding of the nature of the respondents. The demographic information of the realised

sample of the final survey of the study will be showcased as graphs, figures, and tables in the next chapter to share observations and discoveries with the reader about the variables hypothesised.

6.9.1.3 Key constructs

The key constructs of measurement in this study were top management capabilities, technological competence, organisational learning capabilities, entrepreneurial orientation, innovation capabilities and organisational performance. These constructs were measured using a 7-point Likert-type scale as suggested by several scholars who had measured these same constructs in previous studies and ensured their reliability and validity.

6.10.1 Inferential statistics: Structural equation modelling

Structural equation modelling (SEM) is a multivariate data analysis technique that combines aspects of factor analysis and aspects of regression analysis, giving the researcher the ability to investigate relationships concurrently between variables that are either latent or measurable. The multivariate data analysis technique is also employed amongst latent variables for assessing measurement and structural theory in these two instances (Hair, Black, Babin, Anderson & Tatham, 2006; Hair et al., 2017).

This study made use of structural equation modelling analysis using a partial least squares technique commonly referred to as PLS-SEM, where relationships are predicted from a set of dependent relationships concurrently. This helps provide a more robust form of analysis, where regression analysis for example typically falls short (Hair et al. 2006; Hair et al., 2017). Multivariate methods of analysis in general allow the researcher to better comprehend multifaceted relationships by analysing variables simultaneously. PLS-SEM is considered an innovative, emerging and relevant multivariate technique and should be employed in studies that are specifically exploratory in nature with the objective of making a theoretical contribution to an existing body of knowledge, since it places significant emphasis on explaining the variance in dependent variables in the proposed model.

Entrepreneurial orientation and innovation capabilities were used as intervening variables to be regressed on by the independent variables namely top management capabilities, technological competence, organisational learning, and any control variables. Organisational performance was used as a dependent variable to be regressed on by both intervening variables namely entrepreneurial orientation and innovation capabilities. The aim of this exercise was to answer the research question stated in section 6.2.

The data was analysed and validated with the use of literature in previous studies using industry standard statistical software like SAS, SSP and statistical modelling in Microsoft Excel. Preliminary analysis of the data was done in advanced Microsoft Excel to enable a basic descriptive analysis where the mean and standard deviations were identified.

In terms of intrinsically understanding the relationships that exist between the different variables that each construct is comprised of, structural equation modelling (SEM) was carried out. A structural equation modelling analysis was also conducted between the actual constructs themselves, namely top management capabilities, technological competence, organisational learning, entrepreneurial orientation, innovation capabilities and organisational performance, to regulate the legitimacy of the relationships between the constructs. The hypothesis proposed in this study reflects these relationships based on existing literature and an extensive body of knowledge.

It was crucial in this study for a confirmatory factor analysis to be conducted on the above constructs to investigate the legitimacy of the constructs, the elements within each one, and the accumulated percentage of explained variance was also analysed.

The research added control variables for other elements that might influence the estimation outcomes. For this reason, the researcher considered that enterprises may differ in age of respondents, source of funding, location and other variables stipulated in Table 6.7 above.

6.10.1.1 Variance vs. covariance-based SEM

This study applied a variance-based PLS-SEM data analytic technique as opposed to a covariance-based SEM technique for number of reasons. First, the data was analysed using both a covariance-based SEM approach and a PLS SEM approach and both yielded virtually the same results. However, due to the exploratory characteristics of a covariance-based SEM model which is employed in studies where measurement instruments have not been tested before, this study used measurement instruments that have been used in previous studies and had already undergone covariance-based SEM analysis and hence this was not considered necessary to apply once more in this study. Also, no assumptions were made about the distribution of data employed in this study. A covariance-based SEM requires that the data be normally distributed, but no such assumptions were held in this study. The study employed a sample size adequate enough for a PLS-SEM technique to be applied. Also, due to the virtually identical results yielded through the application of both approaches on the dataset, PLS-SEM was the preferred analysis technique as this technique also handles complex models more efficiently in comparison to a covariance-based SEM.

6.10.1.2 PLS-SEM

It was vital to the researcher to ensure adherence to good quantitative research methodological practices when conducting this scientific inquiry. This was achieved by applying PLS-SEM data analytic techniques to predict relationships from a set of dependent relationships concurrently. This is considered best practice in quantitative research analysis as this technique provides for more robust data insights that might not have initially been theorised or hypothesised, thereby providing academics with future possible areas of research focus.

6.10.2 Validity and reliability of research design

Cronbach's alpha coefficients tests were conducted to ensure the validity and reliability of the constructs researched and measured in the questionnaire. These tests were conducted on the constructs to ensure that the entire study is acceptable (Cronbach, 1970; Tseng et al., 2012). Likewise, the study conducted a slew of chi-square and t-tests to ensure there exists no significant differences between the different countries investigated for the strategic technological variables in this study. It is also possible that because all elements used in the study were gathered from the same measuring instrument, common method bias could be present in the study. To ensure this is not the case, Harman's one-factor test was employed (Konrad & Linnehan, 1995). The study also conducted a confirmatory factor analysis on the elements employed in this study to investigate the legitimacy of the constructs, the elements within each one and the accumulated percentage of explained variance.

6.10.3 Data security, integrity and preparation

The data gathered from respondents during the study always adhered to strict security, integrity and preparation guidelines as enforced by both the researcher and the research administrator assigned to the study. Data was always stored on secure password encrypted cloud servers.

6.10.4 External validity

To evaluate the external consistency, interactive sessions were held to ensure a comprehensive understanding of the constructs within the survey and to ensure the rigour and validity of the study, especially one of a highly technical nature such as this. At this stage, this area of study could be generalised to tech startup organisations in Africa, provided that the sample is representative. Furthermore, it is viewed that the results of this study could be applied to tech startups in other contexts, provided that those environments are similar to those on the African continent, specifically those in the key countries looked at, namely South Africa, Nigeria, Kenya and Ghana, holding all other factors constant.

6.10.5 Internal validity

The research instrument was designed from a firm theoretical basis and from other instruments that were tested for reliability and validity. The questionnaire was designed to be visually appealing, not time consuming, and for a respondent to answer each question once only to eliminate the learning effect. All respondents were informed of the objective of the research and participated consensually in the survey. Therefore, the study is seen to be internally valid, assuming all other uncontrollable threats to validity do not materialise.

To evaluate the internal consistency, the Cronbach alphas (Cronbach, 1970) were calculated.

6.10.6 Reliability

To evaluate the internal consistency, the Cronbach alphas (Cronbach, 1970) were calculated, and confirmatory factor analysis was conducted to ensure content reliability. The use of Cronbach's alpha is aimed for an alpha score of 0.7 or higher per construct, by removing items that increase the score or by increasing the number of related items within relevant scales (Drost, 2011). This was done by testing the scale on a reliable statistical programme such as SAS. To increase reliability, it is advised that elements be written more clearly, and test instructions be made easily understandable, which was done in this study (Drost, 2011).

6.11 CONCLUSION

The theory chapters above culminated in the presentation of the final conceptual model as a set of hypotheses this study sought to test, and in the end reject or accept. The theoretical foundations that underpin the relevance and contribution of the study were then discussed in the four literature review chapters that followed to identify the clear knowledge gaps the study intended to fill. Once this sound theoretical foundation was laid, the researcher proceeded to write this chapter which gave a detailed account of the methodology employed to test the conceptual model and hypothesis. The methodical deliberations were elaborated upon and discussed in detail in sub sections relevant to a study at this level. This was done in great detail to ensure that experienced researchers could draw insights from this study for replication purposes or simply to assess the quality of the study and its suggested contributions.

The chapter began by reminding the reader of the purpose of the research. It explained in detail the research design, methodology, target population and sampling considerations, ethical considerations, and data collection and analysis methods employed. The second section of this chapter more specifically shared a detailed a discussion and justification of the use of partial least squares structural

equation modelling (PLS-SEM) as the data analysis approach of choice employed in this scientific inquiry.

The next chapter explains in detail the results of the PLS-SEM model estimation, assisting the researcher to test the composite set of hypotheses he set out to test at the beginning of this study, while relating it closely to the stated objectives of the study and research question the study sought to answer.

CHAPTER 7 :

RESEARCH RESULTS

7.1 INTRODUCTION

Chapter 6 discussed in detail the chosen research design and methodology employed in this study. The research paradigm, scope and sources were also thoroughly deliberated on in the previous chapter to validate the survey instrument employed in both the pilot study and the main study. The data analysis methods used in this study were discussed and justified. The method of analysis employed in the study was Structural Equation Modelling (SEM), as the study employed a conceptual model to test hypotheses discussed in the previous chapter. Furthermore, this chapter differentiates between Partial Least Squares Structural Equation Modelling (PLS-SEM) and Covariance-Based Structural Equation Modelling and makes a case for the selection and justification for PLS-SEM even though that data was analysed using both methods and yielding virtually the same results.

This chapter will discuss and describe the findings of the data collection process in detail, and analyse and interpret the results to answer the research question posed in the first chapter of this study. The chapter begins with the conceptual model that was tested and adapted from Teece's (2018) SST model for dynamic capabilities which includes the summary of the hypotheses tested. Following this, the data analysis and interpretation of the survey is discussed, which includes a presentation of the descriptive statistics of the study. The inferential statistic results are discussed using the PLS-SEM approach which begins with the analysis of the measurement model, for reliability and validity evaluation and the analysis of the structural model as highlighted in the previous chapter. The model fit and path values are discussed to finally test the hypotheses using the overall model.

7.2 CONCEPTUAL MODEL AND HYPOTHESES

The conceptual model employed in this study, Teece's (2007) SST (Sense, Seize, Transform) model for dynamic capabilities and adapted by Anyawu (2016), was introduced and discussed in detail in Chapter 6. This model was used to develop the model depicted in Figure 7.1 below and showcases the four hypotheses tested in this study.

The formulated null hypotheses derived to answer the research question stated in Chapter 1 and again in Chapter 6 are introduced again below:

Ho1a: There is no significant influence of top management capabilities on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho1b: There is no significant influence of top management capabilities on the innovative capabilities of startups in the attainment of tech startup performance.

Ho2a: There is no significant influence of technological competence on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho2b: There is no significant influence of technological competence on the innovative capabilities of startups in the attainment of tech startup performance.

Ho3a: There is no significant influence of organisational learning on the entrepreneurial orientation of startups in the attainment of tech startup performance.

Ho3b: There is no significant influence of organisational learning on the innovative capabilities of startups in the attainment of tech startup performance.

Ho4a: There is no significant influence of entrepreneurial orientation on the performance tech startups.

Ho4b: There is no significant influence of innovative capabilities on the performance of tech startups.

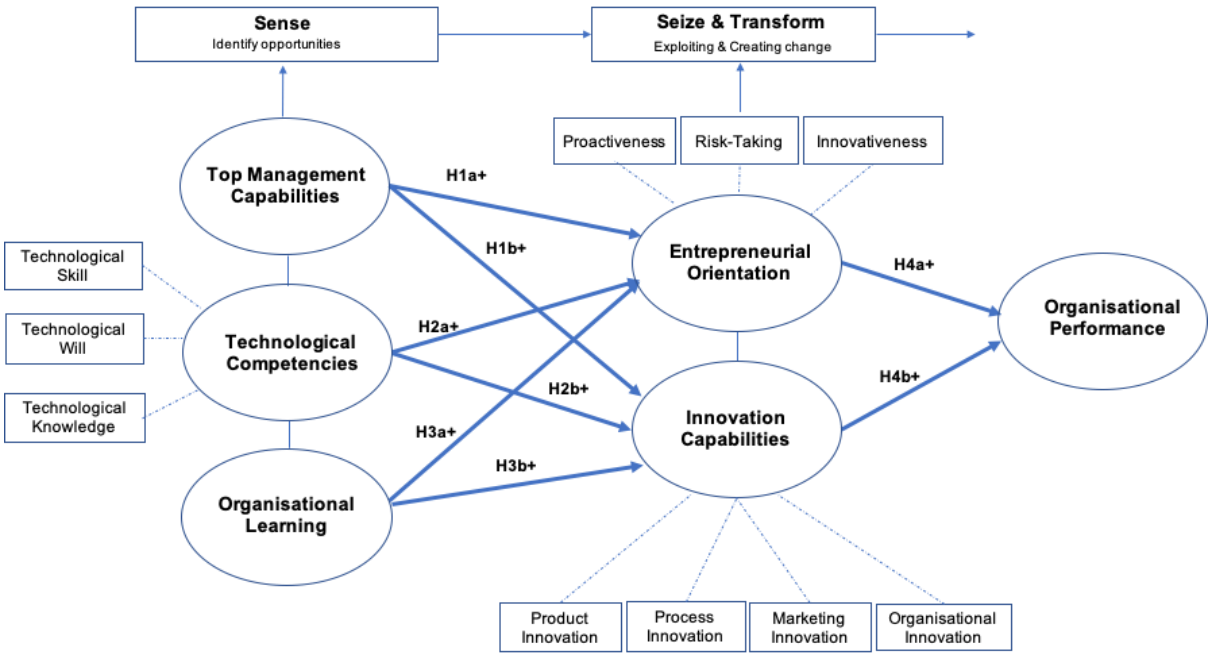


Figure 7.1: Conceptual model adapted from Teece (2007) and Anyawu (2016)

Teece's (2007 & 2008) basic SST model for dynamic capabilities development, which in turn was adapted by Anyawu (2016) for consumer value proposition and competitive advantage development, was adapted in this study to develop a comprehensive dynamic capabilities-based model for tech startup performance development. Teece's SST model postulates that there are three phases in highly technological settings for dynamic capabilities development and these include the sensing phase, the seizing phase and the transforming phase. In this model the sensing capabilities constructs introduced

in the literature review conducted in Chapters 2 through to Chapters 5 were top management capabilities, technological competence and organisational learning. The intervening seizing and transforming variables were newly introduced as entrepreneurial orientation and innovation capabilities, while organisational performance was introduced as the dependent variable in this study as opposed to competitive advantage and consumer value proposition as in Anyawu's (2016) version. Top management capabilities are implied to have a positive influence on entrepreneurial orientation and innovation capabilities (see Chapter 2), as shown by H1a & H1b. Technological competence are implied to have a positive influence on entrepreneurial orientation and innovation capabilities (see Chapter 3), as shown by H2a & H1b. Organisational learning capabilities are implied to have a positive influence on entrepreneurial orientation and innovation capabilities (see Chapter 4), as shown by H3a & H4b. Entrepreneurial orientation and innovation capabilities are both implied to have a positive influence on organisational performance (see Chapter 5), as shown by H4a & H4b.

The next sections detail the results obtained from the main survey, the testing of the hypotheses and examining of the measurement model, descriptive statistics and inferential statistics pertaining to the surveyed sample.

7.3 MAIN SURVEY RESPONSE RATE

The response rate of the quota sampling applied during the data collection process is stipulated in Table 7.1 below.

Table 7.1: Table Response rate analysis

Email & Social Media Invites sent	Active Account	Opened Questionnaire	Started Questionnaire	Completed Questionnaire
A	B	C	D	E
4 867	2522	993	403	254
		Ratio C/B = 39.3%	Ratio D/C = 40.6%	Ratio E/D = 63.0%

As stipulated in the previous chapter, the researcher shared the questionnaire with potential respondents using social media with a filter question in the survey instrument to ensure only those that fit the targeted demographic of respondents were captured. A total of 4867 social media direct messages and email invitations were sent to respondents, of which 2522 did not bounce or indicate that their social media accounts were no longer active. Of the 2522 active accounts, 993 (39.3%) opened the questionnaire and of these only 40.6% were eligible to take the survey as the questionnaire specifically asked the respondents a "yes" or "no" question about whether they worked

for an internet-based startup company in its early stages of development, whose primary product, service, or mode of doing business was largely online/digital. If the response was negative, the survey ended. Of the respondents, 403 (40.6%) responded positively and started the survey, and of these, 254 (63%) completed the survey, resulting in an acceptable rate of response (Bryman & Bell, 2011).

While it is not easy to investigate reasons why 37% of respondents did not complete the survey due to the anonymous nature of the survey, the researcher chose to reflect on some possible reasons as to why this might have been the case.

7.4 DESCRIPTIVE STATISTICS

7.4.1 Sample demographics

Sample demographics were derived from responses received from the 254 survey submissions from individuals who worked for tech startup companies across four key countries in Africa. The sample demographics comprised individuals who worked for a company in its early stages of development and whose primary product, service, or mode of doing business was largely online/digital. Respondents were all required to complete all survey fields in each section/stage of the survey to be counted and saved as a completed response and all incomplete responses were eliminated. The descriptive research results are displayed and discussed in Table 7.2 below.

Based on the choice to use a non-probability sampling technique such as quota sampling as discussed in the previous chapter, the researcher felt that even though it was impossible to conclusively determine whether the sample size of 254 was adequately representative, the quotas were used to make it more generalisable. Given the dearth of information on the precise proportions of tech startups in each of these key countries of focus in this study, and in some cases conflicting statistics on the population of digital or tech startups in Africa (PWC, 2019; Liquid Telecom 2017) the realised quota from the sample felt sufficient and gave satisfactory representation.

7.4.2 Descriptive research results

Table 7.2 below was created as a demographic summary, in support of the discussion of the descriptive results below.

Table 7.2: Descriptive research results summary – n254

Demographics	Category	Percentage of Respondents
Country	Kenya	37%

Demographics	Category	Percentage of Respondents
	Nigeria	30%
	Ghana	22%
	South Africa	12%
Age	<20	2%
	20-29	43%
	30-39	35%
	40-49	14%
	50-59	6%
	>60	1%
Size of startup	<10	22%
	10-50	32%
	51-200	24%
	>200	21%
Job position in startup	Lower-Level Management	21%
	Mid-Level Management	52%
	Top-Level Management	18%
	CEO/Executive	9%
Funding source for startup	Self-Funded/Bootstrapping	37%
	Corporate Partners	19%
	Bank Loans	11%
	Government	7%
	Venture Capitalists	7%
	Competitions	6%
	Angel Investors	5%
	Incubators/Accelerators	4%
	Crowd Funded	3%
CEO Level of Education	Not sure	19%
	PhD and above	21%
	Master's Degree	24%
	Honours Degree	6%
	Degree	20%
	Diploma	6%
	Course	4%
CEO Education Location	Overseas	46%
	Locally	30%
	Not sure	24%
Prior Startup Experience	Yes	60%
	No	40%
Close proximity to tech hub	Yes	52%

Demographics	Category	Percentage of Respondents
	No	48%
Internet Challenges	Yes	71%
	No	29%
Electricity Challenges	Yes	61%
	No	39%

Country

The results showed that 37% of the respondents were working for internet-based startups in Kenya, 30% in Nigeria, 22% in Ghana, and 12% in South Africa.

Age

Age distribution of the respondents showed that only 2% of the respondents were younger than 20 years old, 43% were aged between 20–29, 35% were aged between 30–39 years, 14% were aged between 40–49 years, while 7% were aged 50 years and above.

Size of startup

The results for the sizes of the organisations showed that 54% of the respondents worked for enterprises that had 50 employees or fewer, 24% had 51–200 employees, while 21% had more than 200 employees.

Job position in startups

The results showed that 22% of the respondents were lower-level management employees, 52% were mid-level management employees, 18% were high-level management employees, while 9% were either CEOs or Executives.

Funding source of startups

The results indicated that 37% of the internet-based startups were self-funded while 19% had corporate partners and 11% had their main source of funding as bank loans.

CEOs level of education

The results indicated that CEOs of the companies where these respondents worked, the highest level of education each CEO had obtained was distributed as follows: 24% of them had master's degrees, 21% of them had PhDs, 20% of them had a degree, 6% of them diplomas, 4% of them a basic course and 19% of respondents were unsure.

CEOs education location

The results showed that CEO/Founders of the startups represented in the sample had obtained an education overseas, 30% stated that their CEOs had obtained their education locally, while 24% were unsure.

The respondents were also asked other demographical questions that are not only relevant to this study but also relevant to digital research of this kind conducted on tech startups on the African content (Gautier, Tosun, De Allegri, & Ridde, 2018). The results presented in Table 7.2 above indicate that 60% of the respondents in the sample had worked in other startups prior to their current place of work and 40% had not; 52% indicated that they were currently working on a technology campus/technology hub and 48% were not; 71% of respondents said that they experienced challenges with internet connectivity and/or internet speeds at their places of work that directly affect the work they do and 29% said they did not; and 61% of respondents mentioned that they experienced challenges with electricity/power at work that directly affected what they do on a daily basis and 39% said they didn't. This is also detailed in Table 1 of Appendix C.

Several different techniques were used to analyse the elements within each construct.

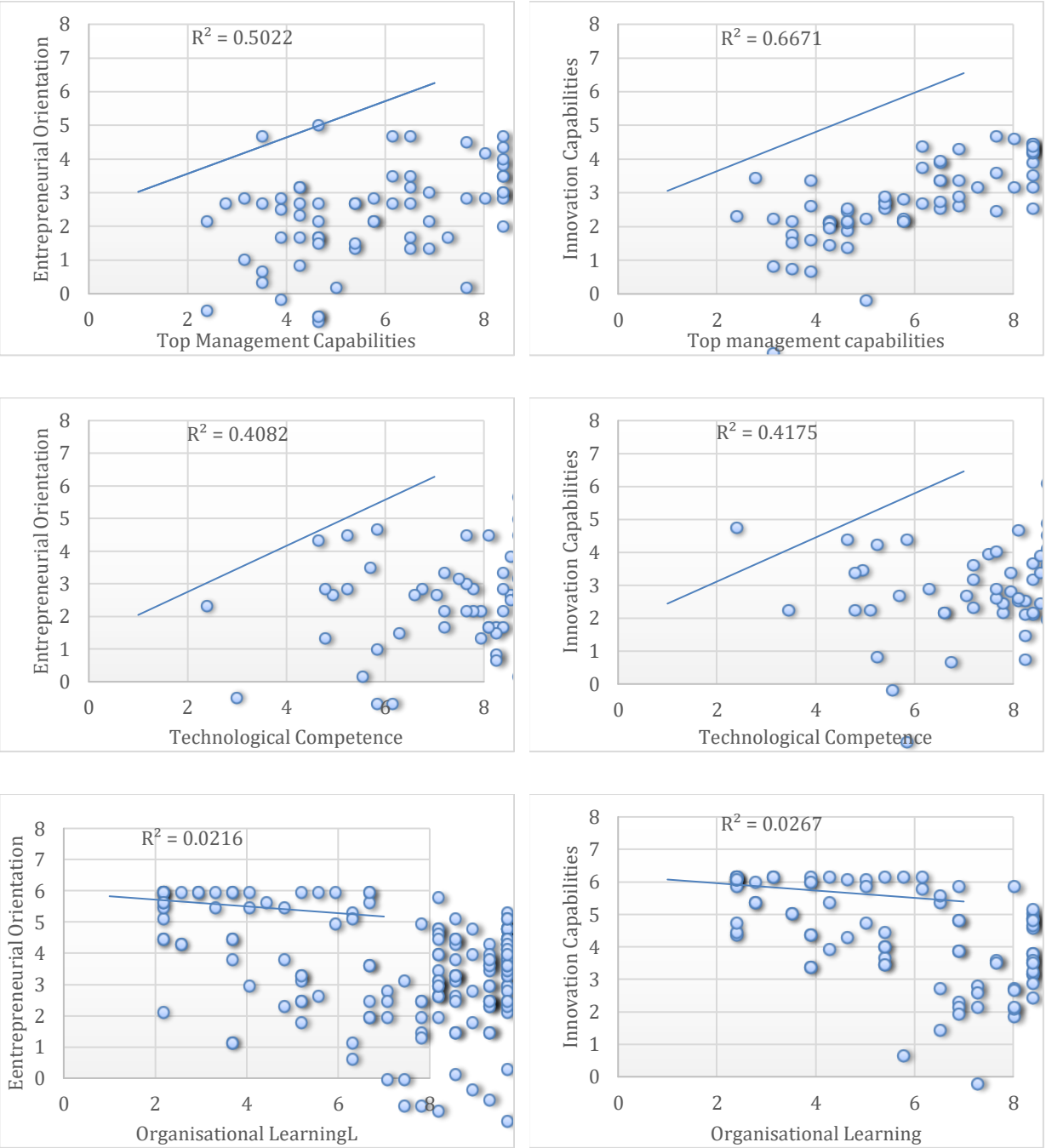
7.5 INFERENTIAL STATISTICS USING PLS-SEM APPROACH

This section below examines and analyses the inferential statistics obtained in this study. The data was analysed using both the Covariance-based Structural Equation Modelling and the Partial Least Square Structural Equation Modelling PLS-SEM with the PLS-SEM method being used as the preferred option using SmartPLS the software package. This section details the measurement model, specifically discussing the analysis of reliability and validity of the model followed, by a detailed examination of the structural model using the overall model and hypotheses. The path values are detailed and discussed to test the fitness of the model and to analyse the measurement and structural models.

7.5.1. Two-dimensional scatterplots

A two-dimensional visual representation of construct intersections was constructed by mapping correlations on a two-dimensional scatterplot. These are presented in Figure 7.2 below as evidence. To use Pearson's *r,* scatter plots were plotted to assess whether there were linear relationships

between variables as hypothesised and not curves (Hair et al., 2017). In Figure 7.2 below, it can be noted that plotted correlations show that there was generally a positive relationship between top management capabilities and entrepreneurial orientation, top management capabilities and innovation capabilities and also between technological competence and entrepreneurial orientation, and between technological competence and innovation capabilities.



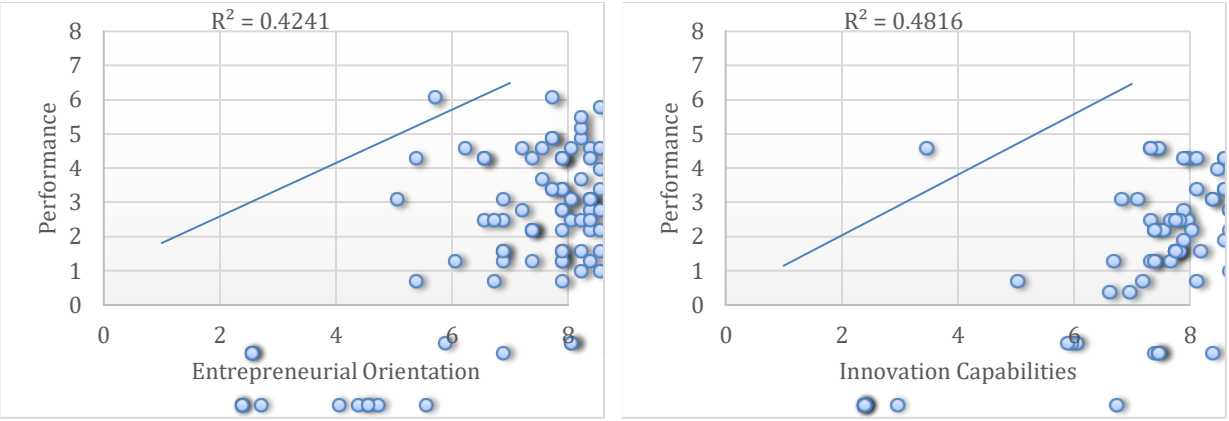


Figure 7.2: Two-dimensional scatterplots

There was however a negative correlation between organisational learning and both entrepreneurial orientation and innovation capabilities which was examined and discussed in detail in section 8.3 below.

7.5.1.1 Summary of correlations

Table 17 in Appendix C below shows a detailed matrix format of Pearson's correlation matrix of r values where the p-values are <0.01 for the constructs measured in this study. Table 4.4 below shows a summary the results.

The coefficient of determination is determined by taking the square value of Spearman r values and is an important indicator as it expresses how much of the variation in one variable is as a result of the effect of the other variable (Hair et al., 2017). The lowest negative r square value is -0.13. for Organisational Learning: Technological Competence and the highest negative r square value is -0.41 for Organisational Learning: Top Management Capabilities. The highest positive r value is 0.817 for Innovation Capabilities: Top Management Capabilities and the lowest positive r value is 0.479 for Organisational Performance: Technological Competence in Table 7.3 below. The range of values between them indicate low association between ranks for values closest to zero, negative association of ranks for values closest to -1 and positive association of ranks for values closest to +1. (Hair et al., 2017).

Table 7.3: Summary of Spearman values

Construct	Value	TMC	TC	OL	EO	IC	OP
Top Management Capabilities (TMC)	Spearman r						

Technological Competence (TC)	Spearman r	0.656					
Organisational Learning (OL)	Spearman r	-0.41	-0.13				
Entrepreneurial Orientation (EO)	Spearman r	0.709	0.639	-0.147			
Innovation Capabilities (IC)	Spearman r	0.817	0.646	-0.163	0.771		
Organisational Performance (OP)	Spearman r	0.614	0.479	-0.85	0.651	0.694	

7.5.2 Evaluation of the measurement model

A PLS-SEM analysis is conducted by evaluating key aspects, firstly, the measurement model, and secondly, the structural model. This is done to test the four hypotheses formulated at the start of this study. The standard quality criteria used for a PLS-SEM reflective measurement model study of this kind was a tested framework used to evaluate the PLS-SEM model employed in this study (Hair et al., 2017). Internal consistency reliability measures were assessed, as well as the validity of the measurement models. A confirmatory factor analysis was conducted to determine the reliability and validity of the constructs in the measurement model. Therefore, to assess the hypothesised model presented, the following perspectives are presented.

7.5.2.1 Internal consistency reliability measures

Composite Reliability

Several different techniques were used to analyse the reliability of the elements within each construct and the reliability between constructs themselves. The results on the composite reliability of the survey measurement items for each scale are represented in Figure 7.3 below. The composite reliability (CR) measure was used as a measure to conduct a confirmatory factor analysis on the constructs measured in this study. The results revealed that there was high and acceptable reliability for all the constructs as the composite reliability values as shown in Figure 7.3 below were all greater than 0.7.

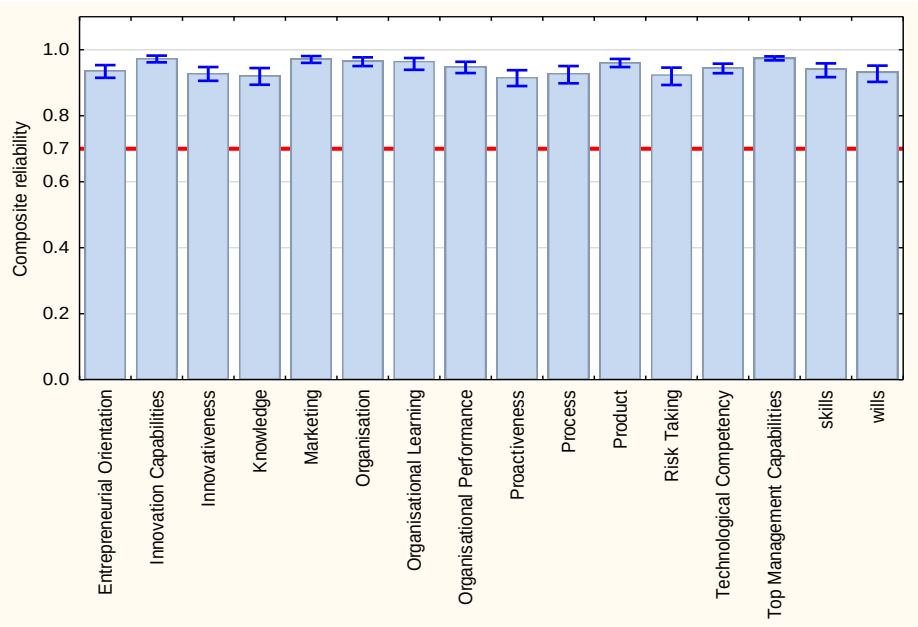


Figure 7.3: Composite reliability (CR)

The study also analysed the data using Covariance-based SEM and the results were practically the same, a further indication of the reliability of the survey measurement items for each scale.

Cronbach Alpha

The more traditional criterion used to measure the internal consistency of a dataset is known as the Cronbach alpha. The Cronbach alpha provides an estimate of the reliability of a set of data points based on the intercorrelations of the indicator variables that are being observed (Hair et al., 2017). When using the Cronbach alpha as a criterion for internal consistency, the assumptions made about the indicator variables are that all of them have equal outer loadings on the construct and as such are all assumed to be equally reliable.

However, the PLS-SEM method prioritises indicators according to the reliability of each of the individual indicators. Therefore, researchers argue that the PLS-SEM method provides a more robust and reliable measurement of internal consistency and this measurement is known as the "composite reliability" measure. This measurement for internal consistency ranges between 0 and 1, where lower values indicate a very poor measure of reliability and higher values indicate a greater level of reliability. In the case of research that is exploratory in nature, composite reliability values between 0.60 and 0.70 are considered acceptable and satisfactory while composite reliability values between 0.70 and 0.94 are considered acceptable and satisfactory for confirmatory research.

Values above 0.95 are not considered acceptable because they may indicate that certain variables in the questionnaire may be measuring the same elements and therefore may not necessarily be a valid measure of the construct. Cronbach's alpha measures are more moderate with lower reliability values, while composite reliability as a measure will in general overestimate internal consistency reliability, bringing about similarly higher reliability scores with genuine reliability, for the most part lying between these two measures as was found in other similar research investigations.

Table 7.4 also indicates that the deletion of any of the items from their respective scales did not in any way lead to a significant increase in the Cronbach's alpha. Therefore, no items were deleted from any scale. The reliability scores for each individual element measuring each construct are available in Appendix C.

In the summary table labelled Table 7.4 below, the Cronbach alpha values reported were all satisfactory and acceptable and thus strongly support high internal consistency of all constructs used in this PLS-SEM model.

Table 7.4: Summary of reliability scale of constructs

Construct/Subconstruct	N	Mean	Std. Deviation	Cronbach's Alpha	Av Inter-Item Correlation
Top Management Capabilities	**254**	**5.37**	**1.625**	**0.92**	**0.877**
Technological Competence Overall	**254**	**5.72**	**1.118**	**0.93**	**0.596**
Technological Competence – Skill	254	5.74	1.271	0.92	0.739
Technological Competence – Will	254	5.81	1.245	0.89	0.735
Technological Competence – Knowledge	254	5.62	1.254	0.87	0.697
Organisational Learning	**254**	**5.15**	**1.675**	**0.93**	**0.839**
Entrepreneurial Orientation Overall	**254**	**5.38**	**1.234**	**0.91**	**0.578**
Entrepreneurial Orientation – Risk Taking	254	5.47	1.361	0.88	0.708
Entrepreneurial Orientation – Proactiveness	254	5.26	1.422	0.87	0.680
Entrepreneurial Orientation – Innovativeness	254	5.40	1.408	0.89	0.720
Innovation Capabilities Overall	**254**	**5.60**	**1.158**	**0.93**	**0.627**
Innovation Capabilities – Product	254	5.35	1.393	0.95	0.767
Innovation Capabilities – Process	254	5.60	1.245	0.90	0.689
Innovation Capabilities – Marketing	254	5.69	1.329	0.90	0.831
Innovation Capabilities – Organisational	254	5.80	1.246	0.96	0.817
Performance	**254**	5.23	1.478	**0.92**	**0.738**

The results reveal that all the constructs had reliable scales as their Cronbach's alpha values and their composite reliability scores were all greater than 0.70.

The next section discusses how a two-dimensional scatterplot was constructed from the data collated in this study.

Composite reliability of outer loadings

For reflective measurement models to be evaluated, the relationships between reflective latent variables and their indicators, in other words, outer loadings, need to be estimated. Outer loadings presented in Table 19 in Appendix C below of the relationships between the construct indicators all display values above 0.70, which indicates sufficient levels of indicator reliability.

Researchers have shared a rule of thumb stating that the values of standardised outer loading must be greater or equal to 0.7 to achieve communality of an item. Sometimes in social research, the researcher might encounter instances where the outer loadings lie anywhere between 0.4 and 0.7, predominantly instances where new scales are used, and the researcher must consider removing these if their removal increases the CR or average variance extracted (AVE) values. However, since this study did not adopt new scales and adopted previously ratified instruments, removals were not necessary and were thus retained, as is evident in Table 19 in Appendix C.

Table 7.5 below summarises the outer loadings, composite reliability (CR) scores and Cronbach's alpha values.

Table 7.5: Final validity composition

		Factor Loading	CR	Cronbach's Alpha
Organisational Learning			**0.955**	**0.954**
OL1	In the last year to 3 years, my organisation has acquired and shared a lot of new and relevant knowledge that has given us a competitive advantage.	.916		
OL2	In the last year to 3 years, members in my organisation have acquired some critical capacities and skills that have given my organisation a competitive advantage.	.971		
OL3	In the last year to 3 years, the organisational improvements have been influenced fundamentally by new knowledge entering the organisation.	.908		
OL4	In the last three years, I would describe my organisation as an organisation that always takes the time out to learn new things.	.869		
Technological Competence			**0.904**	**0.936**

Technological Competence – Knowledge				**0.870**
TCK1	My organisation has the knowledge needed to attract and retain qualified technical staff.	.879		
TCK2	My organisation has the knowledge needed to dominate, generate or absorb basic technologies.	.851		
TCK3	My organisation has the knowledge needed to set up programs oriented towards research & development initiatives that help suppliers and customers.	.786		
Technological Competence – Will				**0.892**
TCW1	My organisation has the will to obtain information about the latest tech trends and technologies relevant to my industry.	.847		
TCW2	My organisation has the will to develop technologically advanced internal processes.	.903		
TCW3	My organisation has the will to use existing technologies in new ways to create products and services relevant to the market they're in.	.822		
Technological Competence – Skill				**0.919**
TCS1	My organisation has the skill required to operate technical systems internally.	.836		
TCS2	My organisation has the skill required to use different software applications needed to conduct business efficiently.	.903		
TCS3	My organisation has the skill required to use technical tools to communication efficiently.	.877		
TCS4	My organisation has the skill required to develop software applications using a variety of software programming languages.	.823		
Top Management Capabilities			**0.966**	**0.966**
TMC1	In general, the top management in my firm assigns technology project champions to help implement new technical projects.	.942		
TMC2	In general, the top management in my firm ensures adequate funding of technology research and development initiatives.	.946		
TMC3	In general, the top management in my firm restructures work processes to leverage technology opportunities in the organisation.	.939		
TMC4	The top management in my firm facilitates technology transfer throughout the organisation.	.918		
Entrepreneurial Orientation Overall			**0.908**	**0.925**
Entrepreneurial Orientation – Risk Taking				**0.879**
EORT1	In general, the managers in my organisation have a strong appetite for high-risk projects and opportunities (with chances of very high return).	.834		
EORT2	In general, the managers in my organisation believe that owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives.	.886		

EORT3	In general, when confronted with decision-making situations involving uncertainty, my firm typically adopts an aggressive posture to maximise the probability of exploiting potential opportunities.	.808		
Entrepreneurial Orientation – Proactiveness				**0.865**
EOP1	In general, my firm typically initiates actions and processes, which competitors then respond to and sometimes follow.	.774		
EOP2	In general, my firm is very often the first business to introduce new product/services, administrative techniques, and operating technologies to the market.	.798		
EOP3	In general, my firm has a strong tendency to introduce novel ideas or products into the market and sometimes into new markets.	.901		
Entrepreneurial Orientation – Innovativeness				**0.885**
EOI1	In general, the top managers of my firm favour a strong emphasis on research and development, technological leadership and small innovations constantly.	.837		
EOI2	In general, my firm launched several new lines of products or services in the past 5 years.	.844		
EOI3	In general, changes in products or services in my firm in the past 5 years have usually been quite dramatic and shocked the market positively.	.864		
Innovation Capabilities			**0.928**	**0.972**
Innovation Capabilities – Process				**0.898**
ICPROC1	In general, my organisation is constantly reviewing and improving its business processes.	.841		
ICPROC2	In general, my organisation changes product development methods at a great speed in comparison with its competitors.	.837		
ICPROC3	In the last three years or so, my company has developed and implemented many new management styles and approaches.	.819		
ICPROC4	In general, when we cannot solve a problem using conventional methods, we improvise using new methods.	.821		
Innovation Capabilities – Product				**0.952**
ICPROD1	The quality of our new products and services is superior to that of our competitors.	.873		
ICPROD2	The product design of our products and services (in terms of functionality and features) is superior to that of our competitors.	.881		
ICPROD3	In general, my organisation has an advantage over its competitors in terms of the new products it offers.	.926		
ICPROD4	In general, changes to our new products and services could be described as major in terms of their improvements in comparison to other competitors in the space.	.909		

ICPROD5	In general, our new products and services incorporate a large body of technological knowledge that is superior to that of our competitors.	.890		
ICPROD6	In general, the applications of our new products and services are quite often different from the applications of our main competitors' products and services.	.777		
Innovation Capabilities – Marketing				**0.967**
ICM1	Our marketing team is constantly improving its campaigns and messaging to stay ahead of the market.	.912		
ICM2	Our marketing team tries to find new and exciting ways to build and improve relationships with our customers.	.922		
ICM3	Our marketing and sales techniques are always revised, and we are always trying to find new methods of promoting our products and services to our customers.	.865		
ICM4	Our marketing team not only conceptualises its marketing ideas, but it also implements new and innovative marketing initiatives.	.952		
ICM5	Our marketing team is constantly looking for new and creative ways to communicate and position the firm's products and services.	.929		
ICM6	Our marketing team is constantly looking for new and creative ways to improve the firm's relationship with its suppliers.	.891		
Innovation Capabilities – Organisational				**0.957**
ICO1	My organisation as a whole is constantly innovating and discovering new opportunities to exploit.	.935		
ICO2	My organisation as a whole is constantly developing and executing new behaviours and innovative ways of working.	.949		
ICO3	My organisation as a whole is constantly coming up with new products and/or services to launch.	.869		
ICO4	My organisation as a whole is constantly embracing new technologies.	.863		
ICO5	My organisation as a whole is constantly coming up with new and advanced administrative practices to develop, utilise and execute.	.900		
Organisational Performance			**0.934**	**0.934**
PERF1	My organisation's performance measured by user/customer growth has been superior to that of its main competitors.	.818		
PERF2	My organisation's performance measured by financial investment has been superior to that of its main competitors.	.893		
PERF3	My organisation's performance measured by revenue has been superior to that of its main competitors.	.886		
PERF4	My organisation's performance measured by customer market share has been superior to that of its main competitors.	.862		

PERF5	My organisation's performance measured by sales of its main products and services has been superior to that of its main competitors.	.836		

The results revealed that there were no issues with reliability of the constructs in the measurement model.

7.5.2.2 Validity

The validity of the measurement model is ratified by assessing convergent validity through a check of the AVE scores. AVE scores are considered acceptable if they are greater than 0.5 (Hair et al., 201).

Discriminant validity

All the evaluations discussed in this chapter appear to show adequate discriminant validity within the sample data displayed and the Fornell-Larcker criterion is used to test whether this is achieved in a set of data. The Fornell-Larcker criterion for there being discriminant validity is that the square root of the average variance extracted (AVE) should be higher than all the correlations with other constructs (Hair et al., 2017). This can also be assessed by the maximum shared variance (MSV) value being less than the AVE. This is evident and shown in Table 7.6 below.

The degree to which a measure correlates positively with other measures of the same construct is shown in its convergent validity indicators, which stem from an investigation into the outer loadings of the indicators, more commonly known in social research as indicator reliability, and the AVE, where large values show that construct-indicators are very similar to those recorded by the construct itself (Hair et al., 2017).

Average variance extracted (AVE) is often used to institute convergent reliability at the level of the construct and an average variance extracted value of 0.50 or greater shows that, in general, the construct in question clarifies more than 1/2 of the variance of its indicators, while an average variance extracted measure of beneath 0.50 indicates that, in general, more variance remains in the error or items than the variance clarified by the construct (Hair et al., 2006; Hair et al., 2017).

Figure 7.4 below shows average variance extracted (AVE) construct values of 0.50 and greater for all constructs and subconstructs used in this study and as such indicates that high levels of convergent validity are present.

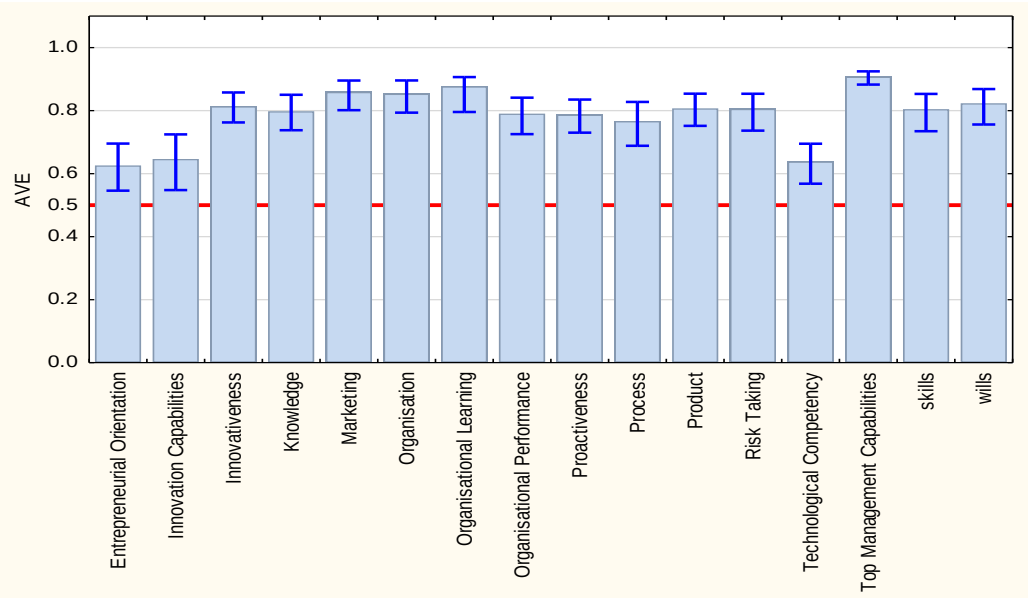


Figure 7.4: Average variance extracted (AVE)

Discriminant validity is achieved when a construct-indicator's loading is greater/ higher than all its loadings with other constructs in the same model, which is evident with the summary table of sample data of the key overall constructs presented in Table 7.6 below.

Table 7.6: Fornell-Larcker criterion

Constructs	EO	IC	PERF	TC	TMC	OL
EO	**0.877**					
IC	,837	**0.874**				
PERF	,720	,720	**0.859**			
TC	,719	,706	,522	**0.872**		
TMC	,784	,860	,644	,720	**0.936**	
OL	-,166	-,151	-,107	-,029	-,046	**0.917**

Table 7.6 above indicates that discriminant validity was not at all an issue in this data set and the reflective latent variables can all be assumed to show adequate discriminant validity.

Another useful measure used to determine discriminant validity in a dataset is known as the heterotrait-monotrait ratio (Hair et al., 2017). This ratio is determined by taking the average of all the correlations of construct indicators and pitting them against the mean of the average correlation of indicators that measure the same construct in that model. All the ratios reported in Table 22 in Appendix C lie below the ceiling value of 0.9, which would have indicated the existence of a lack of

discriminant validity. This further ratifies the results established using the Fornell-Larcker criterion, which also indicated that the constructs discussed in this study meet the required discriminant validity levels.

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is used as evidence of construct validity in theory-based survey instrument construction (Hair et al., 2017). A confirmatory factor-analytic model ensures the differences between the true and observed scores by including pertinent error variances as model parameters in a structural equation modelling framework. The most common method employed to estimate parameters in CFA models is maximum likelihood (ML), which was used in this study to estimate parameters in the model because of its attractive statistical properties, namely asymptotic unbiasedness, normality, consistency, and maximal efficiency (Hair et al. 2017)

Validity and reliability of the constructs were also assessed, using confirmatory factor analysis (CFA). This was conducted using IBM Amos version 21. The model fit indices for the final CFA model are summarised in Table 7.7 below.

Table 7.7: Model fit indices

Absolute Fit Indexes	Acceptable Value	Value	Outcome
GFI	≥0.8	0.996	Acceptable
AGFI	>0.8	0.923	Acceptable
RSMEA	RSMEA<0.08	0.060	Acceptable
NFI	>0.8	0.98	Acceptable
NNFI (TLI)	>0.9	0.99	Acceptable
CFI	>0.9	0.998	Acceptable
χ^2 p-value	>0.05	0.121	Acceptable
CMIN/DF	CMIN/DF <5	2,418	Acceptable

The model fit indices were either within the acceptable range or slightly below the acceptable range. This implies that the model was a good fit for the data.

7.5.2.3 Measurement model evaluation conclusion

As deliberated upon in sections 6.5.2.1 and 6.5.2.2 in this study, the ability for the model to comply with all evaluation criteria provides further support for the measure's reliability and validity.

7.5.3 Evaluation of the structural model

Once the reliability and validity of the measurement model was conducted, the analysis of the structural model using the PLS-SEM approach was used to assess the fit of the model, analyse the path values and discuss the effect sizes. The fit of the model was assessed using a number of methods including the coefficients of determinations and other model fit indices discussed below.

7.5.3.1 Coefficients of determination (R^2 values)

The predictive power of the model is measured by the coefficient of determination (R^2 value) and is calculated as the square of the correlation between an endogenous construct's observed and expected values (Hair et al., 2017). When the R^2 values are higher, this generally indicates a much higher predictive accuracy contingent on the intricacy of the model and the discipline. In some instances, in behavioural research more importantly, even R^2 values of 0.2 are considered high, depending on the complexity of the model (Hair et al., 2006; Hair et al., 2017). In this instance, as is evident in Table 7.8 below, all R^2 values were greater than 0.5, showing really high levels of predictive accuracy.

Researchers also argue that some bias might exist if R^2 values are used as the sole deciding factor when trying to understand the model's predictive power and the values of the adjusted R^2 values should also be examined. The reason for this caution is that a model's predictive accuracy based purely on the model's R^2 values is often biased towards models with several exogenous constructs. Researchers typically prefer models with a lower number of exogenous constructs, models also known as parsimonious models. Table 7.8 below shows the adjusted R^2 values and supports conclusions drawn from the R^2 values as all adjusted R^2 values in this study were above 0.5, showing the model's very high levels of predictive accuracy.

Table 7.8 shows the R^2 and adjusted R^2 values as discussed above and the results reveal that a combination of top management capabilities, technological competence, and organisational learning explains 77% of variation in innovation capabilities and 69% variation in entrepreneurial orientation. This is because the R^2 values were 0.77 and 0.69 respectively. It can also be noted that entrepreneurial orientation and innovation capabilities explains 55% of variation in performance (R^2 = 0.55).

Table 7.8: Coefficients of determination (R^2 & R^2 adjusted values)

	R Square	R Square Adjusted
Entrepreneurial Orientation	0,69	0,69
Innovation Capabilities	0,77	0,77

Organisational Performance	0,55	0,55

The hypothesised model shown in the previous chapter and the beginning of this chapter can now be populated with sample data to reflect a statistical reflective PLS-SEM model as shown in Figure 7.5 below.

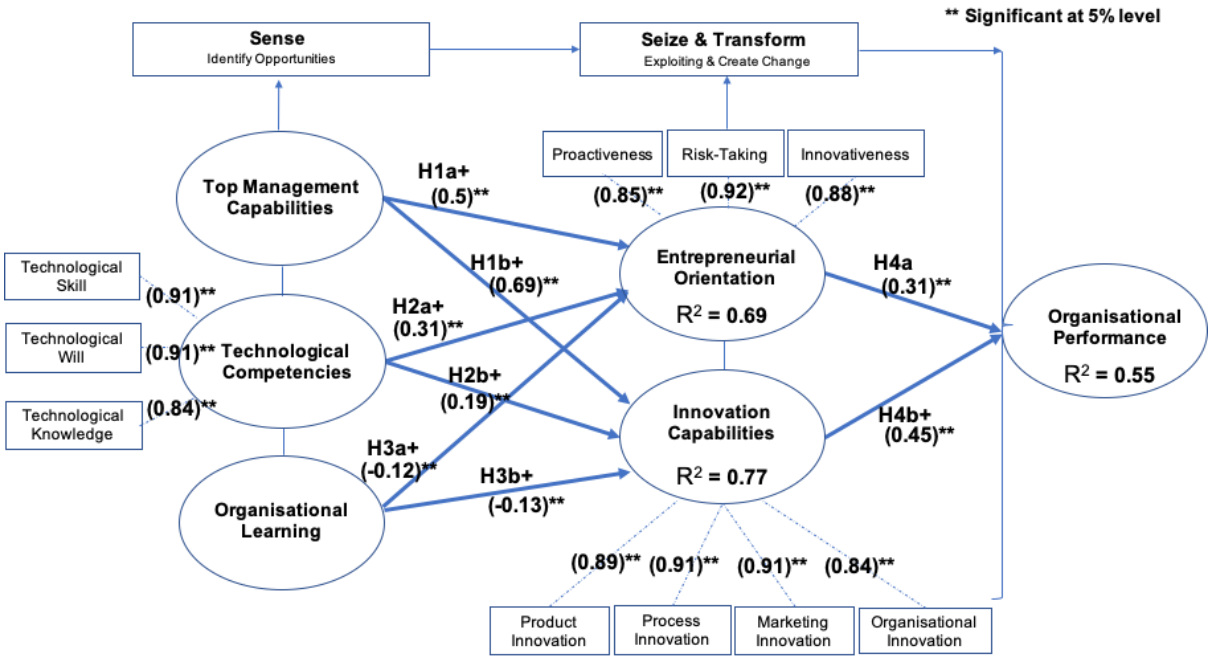


Figure 7.5: The SST model for tech startup performance development with path values & R^2 values

The detailed path values can be found in Table 23 in Appendix C.

7.5.3.2 Path coefficients in the SEM model

The importance and significance of structural model relationships are revealed in path coefficients that have values that generally lie between the numbers -1 and +1, where values nearer +1 characterise strong relationships. The strength and importance of path coefficients are contingent on their standard error estimates, where the t values and p values for all structural path coefficients are recorded. The t values recorded are thus evaluated and if they tend to be larger than the critical value, they are considered statistically significant at a specific level of confidence (Hair, 2006; Hair et al., 2017). At a significance level of 5%, the p value must be less than 0.05 to conclude that the relationship in question is meaningful and significant at 95% level of confidence. (Hair et al., 2017). Table 7.9 below indicates that all the p values for the relationships reported in this study showed values below 0.05 and were thus significant.

The path coefficients below show that in Table 7.9, the standard deviation t values, p values, and confidence levels, the relationships between the constructs are all significant.

The structural path coefficients in a reflective model are meant to be evaluated relative to one another. The greater the path coefficient, the greater its effect on the endogenous latent variable. The square root of the variance change of the exogenous construct changes the endogenous construct by the size of the path coefficient, keeping all other constructs and the path coefficients unchanged. The t values, p values and confidence levels are used to interpret path coefficient results and the significance of the relationships between structural models (Hair et al., 2006; Hair et al., 2017). The t values shown in the path coefficients model above all display values that indicate the relationships between the independent and dependent variables are all significant at a 95% level of confidence. This implies that the null hypothesis can be rejected for three of the four hypotheses put forward in this study. The null hypothesis could not be rejected for the relationship between organisational learning and both entrepreneurial orientation and innovation capabilities as is evident in the negative path coefficient values of -0.12 & -0.13 displayed in Table 7.9.

7.5.3.3 Hypotheses results as a model

Table 7.9 below conveys the statistically derived model showing the relationship between top management capabilities, technological competence, organisational learning and both entrepreneurial orientation and innovation capabilities, as well as the relationship between entrepreneurial orientation, innovation capabilities and organisational performance.

The path coefficient values indicated on the connecting lines of the statistical model reflect positive directional probabilities for three of the four hypothetical claims posed from Chapter 2 to Chapter 5 from which the following claims are derived:

Table 7.9: SEM model – Regression weights

Hypotheses / Path Analysis			Estimates	Standardised Estimates	T-value	P-value	Hypothesis Supported
TCM	→	EO	,334	,543	6,812	***	Supported
TCM	→	IC	,478	,715	10,322	***	Supported
TC	→	EO	,309	,332	4,242	***	Supported
TC	→	IC	,194	,191	3,010	,003	Supported
OL	→	EO	-,080	-,131	-2,935	,003	Not Supported – Negative Relationship
OL	→	IC	-,072	-,109	-2,863	,004	Not Supported – Negative Relationship
EO	→	PERF	,511	,410	4,736	***	Supported
IC	→	PERF	,445	,388	4,723	***	Supported

*Note: *** Indicates that p-value < 0.001*

Results pertaining to Hypothesis 1a (H1a): Top management capabilities have a positive influence on entrepreneurial orientation in the attainment of tech startup performance.

Results presented in Table 7.9 indicate that top management capabilities (β = 0.543, t-value = 6,812, p-value < 0.001) have a significant and positive impact on entrepreneurial orientation. The relationship is significant because the p-value is less than 0.05 and is positive because the standardised coefficient for top management capabilities (B = 0.543) is greater than zero. Thus, the null hypothesis is rejected in favour of the alternative hypothesis. This implies that hypothesis 1a is supported. It is thus concluded that top management capabilities have a positive effect on entrepreneurial orientation.

Results pertaining to Hypothesis 1b (H1b): Top management capabilities have a positive influence on innovation capabilities in the attainment of tech startup performance.

Results presented in Table 7.9 indicate that top management capabilities (β = 0.715, t-value = 10,322, p-value < 0.001) have a significant and positive impact on innovative capabilities. The relationship is significant because the p-value is less than 0.05 and is positive because the standardised coefficient for top management capabilities (B = 0.715) is greater than zero. Thus, the null hypothesis is rejected in favour of the alternative hypothesis. This implies that hypothesis 1b is supported. It is thus concluded that top management capabilities have a positive effect on innovative capabilities.

Results pertaining to Hypothesis 2a (H2a): Technological competence has a positive influence on entrepreneurial orientation in the attainment of tech startup performance.

Results presented in Table 7.9 indicate that technological competence (β = 0,332, t-value = 4,242, p-value < 0.001) has a significant and positive impact on entrepreneurial orientation. The relationship is significant because the p-value is less than 0.05 and is positive because the standardised coefficient for technological competence (B = 0.332) is greater than zero. Thus, the null hypothesis is rejected in favour of the alternative hypothesis. This implies that hypothesis 2a is supported. It is thus concluded that technological competence has a positive effect on entrepreneurial orientation.

Results pertaining to Hypothesis 2b (H2b): Technological competence has a positive influence on innovative capabilities in the attainment of tech startup performance.

Results presented in Table 7.9 indicate that technological competence (β = 0.191, t-value = 3.010, p-value = 0.002) has a significant and positive impact on innovative capabilities. The relationship is significant because the p-value is less than 0.05 and is positive because the standardised coefficient for technological competence (B = 0.191) is greater than zero. Thus, the null hypothesis is rejected in favour of the alternative hypothesis. This implies that hypothesis 2b is supported. It is thus concluded that technological competence has a positive effect on innovative capabilities.

Results pertaining to Hypothesis 3a (H3a): Organisational learning has a positive influence on entrepreneurial orientation in the attainment of tech startup performance.

It can be noted from Table 7.9 that organisational learning (β = -0.131, t-value = -2,935, p-value = 0.003) has a significant and negative effect on entrepreneurial orientation. The relationship is negative because the coefficient for organisational learning is less than zero (B = -0.131). The relationship is significant because the p-value is less than 0.05. The null hypothesis is not supported since the relationship is negative as opposed to the hypothesised positive relationship. It is thus concluded that organisational learning has a negative effect on entrepreneurial orientation.

Results pertaining to Hypothesis 3b (H3b): Organisational learning has a positive influence on innovative capabilities in the attainment of tech startup performance.

It can be noted from Table 7.9 that organisational learning (β = -0.109, t-value = -2,935, p-value = 0.004) has a significant and negative effect on innovative capabilities. The relationship is negative because the standardised coefficient for organisational learning is less than zero (B = -0.109). The relationship is significant because the p-value is less than 0.05. The null hypothesis is not supported

since the relationship is negative as opposed to the hypothesised positive relationship. It is thus concluded that organisational learning has a negative effect on innovative capabilities.

While the data looked at in isolation does not necessarily explain the strong negative relationship between organisational learning and both entrepreneurial orientation and innovation capabilities, it can be assumed that other factors were at play here which the researcher will attempt to reflect on and discuss in detail in the next chapter.

Results pertaining to Hypothesis 4a (H4a): Entrepreneurial orientation has a positive effect on organisational performance.

Results presented in Table 7.9 indicate that entrepreneurial orientation (β = 0.410, t-value = 4,736, p-value < 0.001) has a significant and positive impact on performance. The relationship is significant because the p-value is less than 0.05 and is positive because the standardised coefficient for entrepreneurial orientation (B = 0.410) is greater than zero. Thus, the null hypothesis is rejected in favour of the alternative hypothesis. This implies that hypothesis 4a is supported. It is thus concluded that entrepreneurial orientation has a positive effect on performance.

Results pertaining to Hypothesis 4b (H4b): Innovative capabilities have a positive effect on organisational performance.

Results presented in Table 7.9 indicate that innovative capabilities (β = 0.388, t-value = 4,723, p-value < 0.001) have a significant and positive impact on performance. The relationship is significant because the p-value is less than 0.05 and is positive because the standardised coefficient for innovative capabilities (B = 0.388) is greater than zero. Thus, the null hypothesis is rejected in favour of the alternative hypothesis. This implies that hypothesis 4b is supported. It is thus concluded that innovative capabilities have a positive effect on performance.

7.5.3.4 Interpretation of PLS-SEM results

The data discussed and analysed in the preceding sections appears to indicate the following:

- The measurement model more than sufficiently satisfies the requirements for validity and reliability; and
- The researcher has been able to successfully conduct a PLS-SEM analysis of the results obtained from the survey distribution process discussed in Chapter 7.

It is evident from the analyses that the measurement model discussed above may therefore be described as a comprehensive dynamic capabilities-based SST model for tech startup performance

development that quite articulately links the top management capabilities, technological competencies and organisational learning capabilities deemed necessary to strengthen the impact of innovation and entrepreneurship on organisational performance. Consequently, the resulting measurement model thereby answers the research question posed at the beginning of this study, and provides a theoretical model empirically tested to hold performance benefits for tech startups.

In addition, to understand the negative relationship between organisational learning and both entrepreneurial orientation and innovation capabilities, PLS SEM analyses were conducted on the following subsets of the sample where the sample size was large enough:

1. Individuals working in tech startups who had indicated they had worked for other startups prior to their current one and individuals who had only worked in their current startups.
2. Individuals working in tech startups who had indicated that their founders had received an education overseas and those that had indicated that their founders had received an education locally.

The model results and regression weights shown in Table 24, 25, 26, 27 and 28 in Appendix C indicated that the comprehensive model for performance development still held and organisational learning still had a negative relationship with both entrepreneurial orientation and innovation capabilities. Reasons as to why this may be so are discussed in detail in Chapter 8 below.

7.6 CONCLUSION

From the literature reviewed in Chapters 2 through to Chapter 5 – where the four key hypotheses were developed – the concepts, constructs and elements within them were subjected to a quantitative empirical measurement that was thoroughly reviewed, analysed and discussed in Chapter 7. As a result, the provisional conceptual model put forward in the previous chapter – in which proposed relationships between a comprehensive set of dynamic capabilities were hypothesised – was empirically tested in Chapter 7 and found to be statistically significant.

The research question that led the research inquiry at the start of this study, namely:

> *What is the effectiveness of a comprehensive set of internal dynamic capabilities, namely top management capabilities, technological competence, organisational learning capabilities, entrepreneurial orientation and innovation capabilities on enhancing tech startup performance?*

was thoroughly answered, as shown in the reliability measures, validity measures and structural model discussed in this chapter. It can now be concluded that the research question stipulated in Chapter 1 has been comprehensively answered. A comprehensive dynamic capabilities-based SST model for performance development and their underpinning behaviours were identified and statistically tested to produce statistically relevant results.

The hypotheses in the resulting measurement model were found to be statistically significant, valid and reliable. However, the results discussed clearly indicated that only three of the four hypotheses were supported, while one was rejected. Of the three that were supported, top management capabilities proved to be the overall strongest driver of performance. The researcher will attempt to reflect on and discuss in detail in the following chapter possible reasons why one of the four hypotheses was rejected.

This study quite coherently proposed a comprehensive conceptual model, founded upon a core theoretical framework and analysed through a methodological framework as is proposed by researchers for research inquiries conducted at a doctoral level (Arksey & O'Malley, 2005). These frameworks were developed and discussed with the sole aim of answering the research question stated at the beginning of the study, thereby achieving the goal the study initially set, namely that of solving the research problem articulated at the outset (Hair, Black, Babin, Anderson, & Tatham, 2002; Hair et al., 2006; Hair et al., 2017; Bryman & Bell, 2011).

Through the review and discussion of the research results in this chapter, the researcher was able to discover new insights into what comprehensive set of dynamic capabilities to develop to foster tech startup performance as a way of reducing tech startup failure rates. These new insights have informed the discussions underpinning the improved knowledge obtained which are highlighted in the concluding chapter below. As a result, this study has achieved the concept of synergy and 'knowing' deemed necessary for studies at a doctoral level (Trafford & Leshem, 2009).

CHAPTER 8 :

SUMMARY, CONCLUSION AND RECOMMENDATIONS

8.1 INTRODUCTION

In this chapter the summary, conclusions and recommendations of the study are discussed and presented in a way that ensures that the research question stated at the beginning of the study is answered comprehensively. The contribution the study makes to the field of tech startup literature is discussed and recommendations for further research to augment the findings of the study are presented.

The study set out to determine the relative influence of a comprehensive set of dynamic capabilities on tech startup performance development in African tech startups. The study premised its research question on a view – supported by the latest empirical evidence in the field as discussed in Chapter 2 right through to Chapter 5 – that a comprehensive dynamic-capabilities-based approach to performance development may be more effective than the traditionally limited views that have struggled to give tech startups real answers. The comprehensive dynamic capabilities-based view included drivers the researcher hypothesised by conducting a thorough literature review across four chapters where potential novel relationships were derived using a conceptual framework thoroughly reviewed and discussed at the end of Chapter 5. The comprehensive dynamic capabilities-based approach involved the inclusion of capabilities, albeit disparately discussed in previous studies, that tech startups and their founders have considered relevant, interesting and practical for tech startups looking to develop capabilities to help them grow. The research methodology and approach chosen to provide answers to the stated research question and insight into the research problem were presented and discussed in Chapter 6. Quantitative data was collected from 256 individuals working in tech startups across the key countries of focus in this study, using a secure online six-part survey instrument adapted slightly but validated and employed by other researchers. Furthermore, the sample used in this study did not indicate any bias that the researcher needed to be worried about, as discussed in Chapter 6.

The findings of the study were discussed in Chapter 7 and indicated that the improvement of top management capabilities and technological competence in tech startups had a positive effect on both the entrepreneurial orientation and innovation capabilities, as a way of strengthening their combined impact on performance. The findings also indicated that there was a positive effect on the performance of tech startups who comprehensively focused on improving both their entrepreneurial orientation and their innovation capabilities. This consequently highlighted the importance of the

inclusion of top management capabilities, technological competence, entrepreneurial orientation and innovation capabilities as part of a comprehensive capabilities-based view for the performance development of tech startups in Africa.

The research findings also indicated that the organisational learning capabilities of tech startups negatively influenced the entrepreneurial orientation and innovation capabilities as a way of strengthening their combined impact on performance. While the relationship was significant it was not in the direction as anticipated and this is discussed in detail in the sections below. To understand why this strong negative relationship existed – sample size permitting – the researcher also looked at the results of the measurement model for tech startups whose founders received an education overseas and those that received one locally and found that there were no changes to the nature of the effect of organisational learning and the model in general. The researcher further looked at the results of the measurement model for tech startups whose employees had worked in other startups prior to their current one and those who had not, and found that there were no changes to the nature of the effect of organisational learning and the model in general.

The sections below will attempt to interpret in more detail, conclude findings, broaden discussions where appropriate, and make recommendations for future research related to the claims made in previous chapters. Thus, this chapter attempts to integrate the entire body of research work conducted so far and draw the research process to a close.

8.2 CONCLUSION WITH REGARD TO THE RESEARCH QUESTION

This study aimed to answer the following research question:

> *What is the effectiveness of a comprehensive set of internal dynamic capabilities, namely top management capabilities, technological competence, organisational learning capabilities, entrepreneurial orientation and innovation capabilities on enhancing tech startup performance?*

This study found that a comprehensive set of internal dynamic capabilities was effective in enhancing the performance of tech startups. It also found that of all the drivers, top management capabilities had the strongest effect on strengthening the impact of both entrepreneurial orientation and innovation capabilities on performance.

In conclusion, the results of the study showed that:

- A comprehensive capabilities-based approach to performance development improves the performance outlook of tech startups and provides a cohesive view of capabilities to foster for improving performance in tech startups.
- Top management capabilities as part of this comprehensive dynamic capabilities-based view to performance development in tech startups had a significantly positive effect on strengthening the impact of both entrepreneurial orientation and innovation capabilities on performance attainment in African tech startups.
- Technological competence (which comprehensively included technological will, skill and knowledge) as part of a comprehensive dynamic capabilities-based view to performance development in tech startups had a significantly positive effect on strengthening the impact of both entrepreneurial orientation and innovation capabilities on performance attainment in African tech startups.
- Organisational learning as part of a comprehensive dynamic capabilities-based approach to performance development in tech startups had a significantly negative effect on strengthening the impact of both entrepreneurial orientation and innovation capabilities on performance attainment in African tech startups. While the relationship was significant, it was not in the direction as anticipated.
- There was a significantly positive effect on the performance of tech startups who comprehensively focused on improving both their entrepreneurial orientation (which comprehensively included risk taking, proactiveness and innovativeness) and their innovation capabilities (which comprehensively included product, process, marketing, and organisational innovation).
- There were no significant differences in the measurement model for tech startups whose founders received an education internationally versus those who received an education locally. And in both instances, organisational learning still had a significantly negative effect on strengthening the impact of both entrepreneurial orientation and innovation capabilities on performance attainment in African tech startups.
- There were no significant differences in the measurement of a model for tech startups whose employees had worked in other tech startups prior to their current place of work. And in both instances, organisational learning still had a significantly negative effect on strengthening the impact of both entrepreneurial orientation and innovation capabilities on performance attainment in African tech startups.

The relationships between constructs of the hypothesised model identified from existing literature, discussed and statistically tested, meet the statistical necessities for a reflective PLS-SEM model and as such may be used for theory development. The theory suggests that a comprehensive capabilities-based approach to performance development will improve the performance outlook of African tech startups who focus on improving the top management capabilities, technological competence, entrepreneurial orientation, and innovation capabilities.

Organisational learning as part of this comprehensive capabilities-based model for performance development of African tech startups showed a significant negative effect on strengthening the impact of both entrepreneurial orientation and innovation capabilities on performance. This calls for further research and researcher reflection as to why this may be so. It is possible that given the infrastructural challenges plaguing startups on the African continent, as was evident in the research data showing 61% and 71% of startups surveyed indicating significant challenges with access to electricity and reliable internet respectively, these startups (almost 40% self-funded) found that taking the time out to learn and acquire external techniques hampered their ability to think entrepreneurially and innovate and subsequently perform. This is not so far-fetched considering the hyper-competitive and brutal working environment many these startups are quite often subjected to on the continent. Organisational learning that fosters innovation as discussed in the literature chapters is a function of well-established internal processes underpinned by a technologically supportive environment and macro market efficiencies (Mendi & Costamagna, 2017; Ganzer et al., 2017). This was further deliberated upon and discussed in section 4.2.5 in Chapter 4.

Surdu and Narula (2020), in a recent study that looked at the effect of organisational learning and unlearning on startup internationalisation when comparing emerging markets with developed markets, found the relationship between learning and internationalisation and subsequently firm performance significantly weaker and in some cases negative when comparing emerging markets to more developed markets. The results in this thesis appear to support this view of Surdu and Narula (2020). Mehta and Talway (2019) also highlighted that organisational theory does not consider the motivation of employees in an organisation, which is typically a factor of things both internal and external to the firm. This could imply that African tech startups without stable macro technological infrastructure lack the motivation to take the time out to learn new things as their tech startups lack the maturity and effectiveness required to efficiently conduct day-to-day operations, while staff take the time out to participate in internal learning activities simultaneously. This view is supported by Gachanja et al. (2020) in a recent study as well.

Further research into the link between organisational learning and both entrepreneurial orientation and innovation capabilities in developing markets may bring greater clarity and understanding and is thus suggested as a next step.

Many researchers prior to this study have argued that the existing literature on what drives the performance of tech startups has been oversimplistic or siloed and large numbers of tech startups in reality have been almost consistently failing, even more so for tech startups on the African continent. In reviewing present studies, the researcher could find no studies comparable to this, largely because of difference in scope, differences in data analysis methods and a comprehensive depth of insights disclosed. The comprehensive SST dynamic capabilities-based model for African tech startup performance development that this study contributes as a way of enhancing Teece's theory on dynamic capabilities is provided below as an answer to the research question posed at the beginning of this study in section 1.5 in Chapter 1.

8.2.1 Comprehensive SST dynamic capabilities model for performance development in tech startups

From the above discussions, data analyses and literature review, a comprehensive model for tech startup performance development is proposed, as illustrated in Figure 8.1 below:

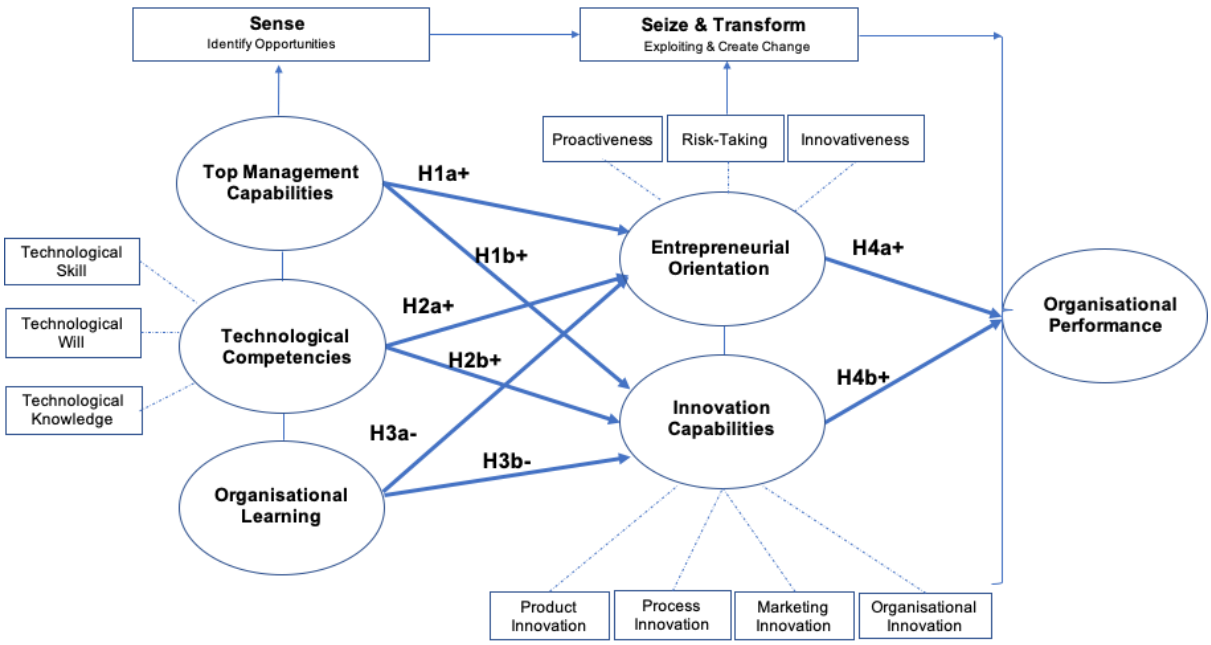


Figure 8.1: Comprehensive SST dynamic capabilities model for performance development in tech startups

The comprehensive SST dynamic capabilities-based model for successful startup performance displayed in Figure 8.1 above suggests that conclusions drawn and discussed in section 8.1 above are all valid, provide comprehensive answers to the stated research question, and meet the statistical necessities for theory development. These conclusions serve as the background for the contributions of the study discussed in section 8.3 below.

8.3 CONTRIBUTION OF STUDY

In the following sections, both the theoretical and practical contributions of the study are argued.

8.3.1 Theoretical contribution of the study

It is hoped that this study will make several theoretical contributions towards tech startup literature, specifically in the designing, development and implementation of comprehensive dynamic capabilities-based approaches to tech startup performance development.

First, previous traditional capabilities-based approaches in tech startup literature have almost consistently looked at either the tech startup's external dynamic capabilities or internal dynamic capabilities in isolation (see section 1.2.3) and have subsequently been described as irrelevant and oversimplistic (see section 1.2.2). As a result, they have been unable to answer why many startups fail and so few succeed. Researchers argue that without a comprehensive view that looks at capabilities from various disciplines, Teece's SST dynamic capabilities-based model will always be simply insufficient (Anyawu 2016; Gachanja et al., 2020). In this study, the comprehensive dynamic capabilities-based approach used for tech startup performance development, and informed by empirical evidence, seems to have bridged the gap in the literature and met those requirements. It is hoped that the use of this comprehensive dynamic capabilities-based model will provide tech startups and their founders with more insight into the complete set of dynamic capabilities tech startups require to improve performance in the African context.

Second, previous studies suggest that two of the most argued capabilities considered crucial for startups looking to gain a competitive advantage are an entrepreneurial orientation (Ganzer et al., 2017) and innovation capabilities (Singh et al., 2019) of tech startups. These studies have dealt with each of them separately regarding tech startups' performance development. Other researchers have argued that tech startups' chronic low performance suggests that existing drivers of performance identified by Schumpeter, including both EO and IC, are ambiguous at best and simply not enough at worst (Vaznyte & Andries, 2019). It is possible that the application of those two drivers singly as stand-alone and not co-jointly as an amalgam could account for the lack of efficacy in driving performance. This study's findings showed that a combined development of both entrepreneurial orientation and

innovation capabilities, rather than singly, could more effectively drive tech startups' performance. Thus, the study contributes to existing knowledge a particular developmental view of entrepreneurial and innovative capabilities as effective drivers of performance in African tech startups. This finding would have implications for other potential tech startup performance drivers previously looked at in isolation in Schumpeter's theory of entrepreneurship and innovation theory.

Third, the extant literature suggests that dynamic capabilities-based approaches to the development of tech startup performance should emphasise measurable, relevant, and practical capabilities for an improved performance outlook (Martens et al., 2018; Monteiro et al., 2019). What is being implied is the need to look for dynamic capabilities that drive what is already known and valuable (i.e., relevant), what can be quantified (measurable), and what tech startups and their founder can effectively develop and implement (practical). In accord with these recommendations, this study has addressed the issues of relevance, measurable outcomes, and practical considerations for an improved startup performance outlook in demonstrating empirically the effects of a comprehensive model of practical capabilities, namely top management capabilities, technological competence, and organisational learning capabilities on strengthening the impact of some identified individual drivers of tech startup performance.

Lastly, in previous studies (see section 1.3), the contexts used to develop dynamic capabilities-based approaches to tech startup development across South Africa, Nigeria, Kenya, and Ghana involved a top-bottom process. The policy makers and new small business owners determined the context without consultations or finding out from tech startup founders and individuals working in high growth tech startups what they felt was important, relevant, and internally accessible for performance development. In this study, the comprehensive dynamic capabilities-based approach was developed from insights received from participating individuals and founders working in tech startups and empirically tested and ratified using participants from the participating four countries on the African continent.

Given the paucity of research or published literature on one of the results of this study, of a significant negative effect of organisational learning as part of a comprehensive dynamic capabilities-based approach for fostering performance in African tech startups, the finding has implications for the work or business environment of the participants in the study. The finding in the African setting could serve as evidence-based data to better understand how firms in developing countries such as those in Africa can foster organisational learning that is customised and accessible, particularly to firms operating in infrastructurally ill-equipped and under-resourced business environments.

In summary, given the dearth of information in the literature of comprehensive capabilities-based models needed to improve tech startup performance in Africa, the study's overall findings could contribute as evidence-based data for developing comprehensive approaches to tech startup development previously regarded as irrelevant, oversimplistic, and limited.

8.3.2 Practical contribution of the study

From a practical perspective, the findings provide evidence that can contribute on the African continent to tech startup founders, policy makers, managers, tech incubators, and tech startup accelerators looking to improve their performance outlook as follows:

- Tech startups have never been in a more polarised and rapidly changing technological environment than the one we are in today. Leaders in business, government and in various facets of society will require an approach towards technology, entrepreneurship and innovation that is not only dynamic but all-encompassing of present and future societal challenges (Ganzer et al., 2017; Teece, 2018; Singh et al., 2019; Surdu & Narula, 2020; Gachanja et al., 2020). In this study, a comprehensive and cohesive dynamic capabilities-based approach for tech startup performance development was empirically identified. As a result, the hope is that the policy makers and government agencies for the national systems of innovation in Nigeria, Kenya, Ghana, and South Africa will design comprehensive policies specifically catered towards technology startups and not just small businesses in general. This study has provided a comprehensive set of policies built on insights identified by individuals and founders working in these high-tech industries as relevant, important and accessible.

- The research findings provide a comprehensive set of dynamic capabilities needed to foster performance for incubators and accelerators to use as a benchmark in developing programmes to help tech startups across the African continent grow. The findings more specifically suggest that incubators and accelerators who want to help tech startups improve their performance, need to do number of things. They need to improve their top management capabilities most significantly, while at the same time improving their technological skill, will and knowledge as a way of enhancing the entrepreneurial culture, and innovation capabilities in pursuit of an in improved performance orientation. While founders in high-growth knowledge-based industries are appointed for their technical proficiencies and startup experience, the greater their ability to demonstrate an appreciation for the role technology competence, innovation leadership and learning plays in how proactive they become and how

much innovative outputs they are able to drive, the greater their ability to outlast their competitors in this ever-complex high-tech environment.

- One of the most fundamentally important aspects of this research is the cross-national empirical nature of the collated data across several internet and digital technology startup organisations across the African continent. This multi-territory quantitative research study hopes to better educate and enlighten investors interested in tech startup organisations in this sector on the precise capabilities to watch when investing in management capabilities and technological competency development that foster tech startup performance and improve their return on investment at a micro level and economic prowess at a macro level.
- In addition, the research results indicate that a comprehensive capabilities-based approach to performance development holds true for founders contemplating acquiring a formalised education. The results indicated that the founders of the tech startups surveyed on the continent were all well-educated. The more encouraging news is that the results highlighted that whether founders were educated locally or internationally showed no significant differences in the comprehensive dynamic capabilities-based model for performance development. Therefore, entrepreneurs who might have been largely discouraged to get a more formal education internationally due to exorbitant fees may be able to help their startups perform better by studying locally, through remote learning mediums at more affordable local institutions.

Tech startups in Africa have entered a period of unprecedented scientific and technological advancement in which incessant innovation brings about novel complexities as well as opportunities for managers, stakeholders, and entire industries to contextualise, manage and respond accordingly. The task ahead for practitioners is unparalleled and even more complex to navigate and translate into tangible outcomes on the African continent. Management capabilities, technological competence, an entrepreneurial mindset, the ability to learn what is appropriate for a context and an ability to innovate cohesively will not only become crucial at a micro level but will also be needed at a macro-level. Private sector, public sector and academics will have to work collaboratively to drive startups and entrepreneurs (the cornerstone of any economic society) to new heights for sustained socio-economic development and poverty alleviation.

It is thus confirmed that access to the contributions of this study not only benefits startups and entrepreneurs in practice, but also other stakeholders such as tech startup incubators and accelerators, investors, and policy makers as identified and discussed in section 1.7.

8.4 SUGGESTIONS FOR FUTURE RESEARCH

The findings of the study present some further research opportunities, which include the following:

First, the comprehensive dynamic capabilities-based model developed in this study has proven to be effective in fostering tech startup performance and has also proven effective in strengthening the impact of a combined set of dynamic capabilities – previously studied in isolation – on performance development. This finding, however, should not be taken to imply that the results of the survey and data analysis process represent the definitive work on a finite set of capabilities, especially given that one of the four relationships was negative, albeit significant. Instead, this thesis provides the strong groundwork for further research into the negative relationship between organisational learning and both entrepreneurial orientation, and innovation capabilities. Although it is not uncommon in developing markets for this to be so, the number of studies where this view has been ratified is not substantial and provides an opportunity for further research. New insights may help inform better decision making amongst founders and tech startups alike on the continent.

Second, replication of this study to detect any changes in findings in future may reveal patterns related to capabilities and the nature of its suggested comprehensive capabilities-based model when applied to individual countries on the African continent. A study with a larger sample may reveal more insights into the model where the tech startup's main source of funding may be used as a control variable to identify differences, if any, to the performance model put forward in this study. Other methodological approaches and data analyses techniques may be explored, a mixed-methods approach for example, with interviews conducted with CEOs to shed some light on possible insights beyond the scope of this study.

Third, extension of this study to include perspectives gained from startups that are not predominantly self-funded but possibly funded by incubators, accelerators and governments could allow for an interesting comparative analysis and the exploration of potential similarities and differences between their perspectives, which may further enhance or refute the comprehensive capabilities-based model put forward in this study. This may also further explain the unpopular negative relationship between organisational learning and both entrepreneurial orientation and innovation capabilities but could ultimately provide researchers with the opportunity to explore novel relationships and correlations. In addition, further research is needed to understand the style of implementation that startups must take when seeking to apply the research findings from this study. Does the comprehensive model only work when the style of implementation is dynamic as is evident in developing markets? Or will strict linear styles of implementation also prove successful in developing markets? These are some of the questions that further research into this study may seek to answer. Further research will be needed

to enhance the understanding of the definitive combination of dynamic capabilities needed to drive performance that inform the choices made by tech startups in reality, in which way and why.

Finally, as discussed earlier in section 1.7, entrepreneurs and technology innovation leaders experience similar challenges globally, which suggests the potential replication of the findings and insights derived from this study internationally, in more developed markets, as this study focused on performance orientation of startups at knowledge-intensive technology startups across countries in developing regions.

The above discussion provides some insight into potential opportunities for future research the results of this study have helped shape. The conclusions and contributions drawn from the study provide an empirical backdrop for future researchers to explore.

8.5 PERSONAL REFLECTIONS ON STUDY

As the researcher reflects on this study, one of the most fundamentally important aspects of this research, not only the cross-national empirical nature of the collated data across several tech startups across the African continent but also this study's *true* ability further sheds some light on the haunting question "why do so many African startups fail so frequently?" By gaining an empirical understanding of the comprehensive dynamic capabilities-based model deemed essential to foster entrepreneurship, innovation, and performance, we are a step closer to fully answering this question innovation leaders in high-tech businesses ask themselves every day.

This multi-territory comprehensive dynamic capabilities-based approach to performance development hopes to better educate and enlighten investors interested in investing in high-growth firms on the African continent on the precise capabilities to pay attention to when investing that could simultaneously foster entrepreneurship and innovation, and consequently firm performance at a micro level and socio-economic development at a macro level.

The study hopes to add to the body of knowledge on leadership, technology, entrepreneurship, innovation and learning by providing real practical insights for businesses involved in the startup ecosystem struggling to find answers to questions that directly impact the poverty alleviation and job creation imperatives of many countries on the African continent.

8.6 CONCLUSION

A summary and conclusions drawn from the results of this study and the importance of the findings for the African context were discussed in detail. The theoretical and practical contributions that not only answer the research question but form the basis for the rationale of the study were all

comprehensively discussed in this chapter and recommendations for further research to researchers interested in this field of study were proposed. The results and the conclusions drawn from the study highlight the importance of the study for entrepreneurial literature not only globally but for African entrepreneurial literature more importantly as well. The significance of the study for tech founders, individuals working in tech startups and policy makers highlighted at the start of the study (see section 1.3 and section 1.5), was discussed in detail. The significance was further endorsed by the results, reflections and conclusions drawn from this concluding chapter of the study. The researcher's personal reflections on the study were also discussed as a way for the researcher to comprehensively bring the research and scientific inquiry process to a close.

REFERENCES

Acosta, A., Crespo, A., & Agudo, J. (2018). Effect of market orientation, network capability and entrepreneurial orientation on international performance of small and medium enterprises (SMEs). International Business Review, 27(1), 1128-1140.

Adewale, O., & Babatunde, S. (2015). Relationship between network resources and organizational efficiency: Evidence from Nigeria Banking Industry. *SSRN Electronic Journal*, 1-12.

Ahmad, H., & Azhari, A. (2020). The effects of institutional ownership and growth opportunities on Malaysian corporate risk-taking behaviour. *International Journal of Psychosocial Rehabilitation*, *24*(3), 1543-1558.

Ahmad, S. (2017). Patents for pharmaceutical products and technology: An updated review. *Research Journal of Pharmaceutical Dosage Forms and Technology*, *9*(3), 98-100.

Akin, M. (2017). Leadership styles' importance on the organisational innovation and creativity. *International Journal of Academic Value Studies (Javstudies JAVS)*, *3*(11), 200-213.

Akolaa, A. (2018). Foreign market entry through acquisition and firm financial performance. *International Journal of Emerging Markets*, *13*(5), 1348-1371.

Algahtani, A. (2014). Are leadership and management different? A review. *Journal of Management Policies and Practices, 2*(3), 71-82.

Alkhaffaf, M. (2018). Investigating the mediation role of information technology (IT) components in the relationship between knowledge management (KM) processes and decision-making. *International Journal of Business and Management*, *13*(4), 108-126.

Almonaitiene, J. 2013. Leadership and creativity: Is there a common psychological background for both*? Social Sciences, 80*(2), 54-63.

Alvarez-Torres, F., Lopez-Torres, G., & Schiuma, G. (2019). Linking entrepreneurial orientation to SMEs' performance. *Management Decision*, *57*(12), 3364-3386.

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and creativity in organizations: A state-of-the-science review, prospective commentary, and guiding framework. *Journal of Management, 40*(5), 1297-1333.

Anjos, F. (2016). Resource configuration, inter-firm networks, and organizational performance. *Mathematical Social Sciences*, *82*(C), 37-48.

Anyawu, C. (2016). Dynamic Entrepreneurial and Managerial Role in the Front End Loading (FEL) Phase for Sensing and Seizing Emerging Technologies. Journal of Management, 6(5), 146-157.

Aragón, J., García-Morales, J., & Cordón Pozo, E. (2007). Leadership and organizational learning's role on innovation and performance: Lessons from Spain. *Industrial Marketing Management,* 36(3), 349-359.

Aragon-Correa, J., Hurtado-Torres N., Sharma, S., García-Morales, V. (2008). Environmental strategy and performance in small firms: A resource-based perspective. *Journal of Environmental Management, 86*(1), 88-103.

Aragon-Correa, J., Hurtado-Torres N., Sharma, S., García-Morales, V. (2008). Environmental strategy and performance in small firms: A resource-based perspective. *Journal of Environmental Management, 86*(1), 88-103.

Archer, M. (1982). Morphogenesis versus structuration: on combining structure and action. *British Journal of Sociology,* 33(4), 455-483.

Arif, M. (2008, September 11). Entrepreneurial innovation. *SSRN Electronic Journal*. Retrieved from https://doi.org/10.2139/ssrn.1266668

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology, 8*(1), 19-32.

Atuahene-Gima, K., & Ko, A. (2001). An empirical investigation of the effect of market orientation and entrepreneurship orientation alignment on product innovation. *Organization Science, 12*(1), 54–74.

Audet, J., & Marcotte, G. (2018). Student trade missions: An experiential learning opportunity. *American Journal of Business Education (AJBE)*, 11*(1)*, 1-14.

Augustie, C., & Saad, N. (2019). Examining the moderating effect of environmental hostility on the relationship between entrepreneurial orientation and international performance of Indonesian SMEs. *International Journal of Academic Research in Business and Social Sciences*, 9(7) 520-526.

Autio, O. (2011). The development of technological competence from adolescence to adulthood. *Journal of Technology Education, 22*(2), 71-89.

Avlonitis, G., & Salavou, H. (2007). Entrepreneurial orientation of SMEs, product innovativeness, and performance. *Journal of Business Research,* 60(1), 566-575.

Ayough, A., Alemtabriz, A., & Tavanaei, M. (2020). Investigating the impact of technological distinctive competencies and information technology capabilities on internet entrepreneurship by means of innovation capability. *AMC Indian Journal of Entrepreneurship*, *3*(1), 27.

Azar, G., & Ciabuschi, F. (2017). Organizational innovation, technological innovation, and export performance: The effects of innovation radicalness and extensiveness. *International Business Review*, *26*(2), 324-336.

Babatunde, S., Perera, S., & Zhou, L. (2016). Methodology for developing capability maturity levels for PPP stakeholder organisations using critical success factors. *Construction Innovation*, *16*(1), 81-110.

Balunova, Z. (2017). Credibility and building a good corporate reputation. *Scientific Papers of Silesian University of Technology. Organization and Management Series*, *2017*(110), 7-12. Retrieved from https://www.polsl.pl/Wydzialy/ROZ/ZN/Documents/z%20110/balunova%20zuzanna.pdf

Baron, R., Mueller, B., & Wolfe, M. (2016). Self-efficacy and entrepreneurs' adoption of unattainable goals: The restraining effects of self-control. *Journal of Business Venturing*, *31*(1), 55-71.

Barradell, S., & Fortune, T. (2019). Bounded – The neglected threshold concept characteristic. *Innovations in Education and Teaching International*, *57*(3), 296-304.

Becker, M., & Zirpoli, F. (2017). How to avoid innovation competence loss in R&D outsourcing. *California Management Review*, *59*(2), 24-44.

Beckley, J., Paredes, M., & Lopetcharat, K. (2012). *Product innovation toolbox*. Hoboken, NJ: John Wiley & Sons.

Bedi, H. (2018). A contingency approach to proactiveness - Business performance relationship. *Indian Journal of Marketing*, *48*(12), 34-49.

Belderbos, R., Grabowska, M., Leten, B., Kelchtermans, S., & Ugur, N. (2017). On the use of computer-aided text analysis in international business research. *Global Strategy Journal*, *7*(3), 312-331.

Bellner, B., & MacLean, D. (2015). Dynamic managerial capabilities and competitive advantage. *Strategic Management Quarterly*, 3(3), 1-23.

Berchicci, L. (2013). Towards an open R&D system: internal R&D investment, external knowledge acquisition and innovative performance. *Research Policy*, *42*(1), 117-127.

Bessant, J., & Tidd, J. (2013). *Managing innovation* (5th ed.). Hoboken, NJ: John Wiley & Sons.

Bhaskar, R. (1975). *A realist theory of science*. London: Verso.

Bibi, S. (2019). Keynes, Kalecki and Metzler in a dynamic distribution model. *Cambridge Journal of Economics, 44*(1), 73-104.

Bitondo, D., & Frohman, A. (1981). Linking technological and business planning. *Research Management*, *24*(6), 19-23.

Blaug, M., & Sawyer, M. (1987). The economics of Michael Kalecki. *Economica*, *54*(214), 258-259. Retrieved from https://doi.org/10.2307/2554399

Bolívar Ramos, M., García Morales, V., & García Sánchez, E. (2012). Technological distinctive competencies and organizational learning: Effects on organizational innovation to improve firm performance. *Journal of Engineering & Technology Management*, *29*(3), 331-357.

Boso, N., Story, V., & Cadogan, J. (2013). Entrepreneurial orientation, market orientation, network ties, and performance: Study of entrepreneurial firms in a developing economy. *Journal of Business Venturing*, 28(1), 708-727.

Bougie, R., & Sekaran, U. (2016). *Research methods for business: A skill-building approach*. West Sussex, United Kingdom: John Wiley & Sons, Ltd.

Brahma, G. (2020). Entrepreneurial orientation and business performance: An assessment of startup companies. *SSRN Electronic Journal*, 13(2), 1-13.

Brandes Institute. (2017, June 9). *Integrating global micro caps in your portfolio*. Brandes Institute Research Paper No. 2015-03. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2983975

Braver, L., & Danneels, E. (2018). Propensities return us to the discovery-creation debate about entrepreneurial opportunities. *Academy of Management Review*, *43*(4), 812-815.

Bryman, A., & Bell, E. (2011). *Business research methods*. 3rd edition. New York, USA: Oxford University Press.

Buhl, A. (2018). Do it yourself - A lean startup toolbox for employee-driven green product innovation. *International Journal of Entrepreneurship and Innovation Management*, *22*(4/5), 526-544.

Byrd, T., & Davidson, N. (2003). Examining possible antecedents of IT impact on the supply chain and its effect on firm performance. *Information & Management*, *41*(1), 243-255.

Cadogan, J. (2012). International marketing, strategic orientations and business success: Reflections on the road ahead. *International Marketing Review, 29*(4), 340-348.

Cantwell, J., & Janne, O. (1999). Technological globalisation and innovative centres: The role of corporate technological leadership and locational hierarchy. *Research Policy, 28*(2), 119-144.

Carvalho, L., & Goodyear, P. (2018). Design, learning networks and service innovation. *Design Studies*, *55*, 27-53.

Chang, J., Bai, X., & Li, J. (2015). The influence of leadership on product and process innovations in China: The contingent role of knowledge acquisition capability. *Industrial Marketing Management, 50*(1), 18-29.

Chironga, M., Leke, A., Lund, S., & Van Wamelen, A. (2011). The Globe: Cracking the next growth market: Africa. *Harvard Business Review,* 1-7 (May).

Christensen, C., McDonald, R., Altman, E., & Palmer, J. (2018). Disruptive innovation: An intellectual history and directions for future research. *Journal of Management Studies, 55*(1), 1043-1078.

Clark, K., & Ramachandran, I. (2018). Subsidiary entrepreneurship and entrepreneurial opportunity: An institutional perspective. *Journal of International Management*, 1(1), 1-15.

Clark, R. (2018). Lessons learned from an entrepreneurial career in workforce learning. *Education Review // Reseñas Educativas*, *25(1)*, 1-8.

Colombo, S. (2016). A model of three cities. *International Regional Science Review*, *39*(4), 386-416.

Connelly, L. (2008). Pilot studies. *Medsurg Nursing*, 17(6), 411-412.

Covin, J., & Slevin, D. (1991). A Conceptual Model of Entrepreneurship as Firm Behaviour. *Entrepreneurship Theory and Practice*, *16*(1), 7-26. Retrieved from https://doi.org/10.1177/104225879101600102

Cozzarin, B. (2015). Impact of organizational innovation on product & process innovation. *SSRN Electronic Journal*, 13(1), 23-35.

Crescenzi, R., & Gagliardi, L. (2018). The innovative performance of firms in heterogeneous environments: The interplay between external knowledge and internal absorptive capacities. *Research Policy*, *47*(4), 782-795.

Creswell, J. (2002). *Research design: Qualitative, quantitative, and mixed methods approaches*. 2nd ed. London: Sage Publications.

Cronbach, L. J. (1970). *Essentials of psychological testing*. New York: Harper & Row.

Cross, G. S., & Proctor, R. N. (2016). Packaged pleasures: How technology and marketing revolutionized desire. *Technology and Culture*, *57*(4), 1027-1028.

Czajkowska, A. (2019). The role of financing innovative technological investments with credit for technological innovations. *Ekonomia Prawo, 18*(4), 413-420.

Danneels, E. (2016). Survey measures of first- and second-order competences. *Strategic Management Journal*, *37*(10), 2174-2188.

Dayaratne, S., & Gunawardana, K. (2015). Financial and non-financial measures for sustainability in SMEs. *SSRN Electronic Journal*, 1(1), 1-22.

Deligianni, I., Voudouris, I., Spanos, Y., & Lioukas, S. (2019). Non-linear effects of technological competence on product innovation in new technology-based firms: Resource orchestration and the role of the entrepreneur's political competence and prior startup experience. *Journal of Technovation, 88*(C). Retrieved from https://econpapers.repec.org/article/eeetechno/v_3a88_3ay_3a2019_3ai_3ac_3as0166497217306545.htm

Denicolo, P., & Park, C. (2013). Doctorateness – An elusive concept? *Critical Issues in Higher Education,* 191-197.

Deshpande, A. (2018). Concurrent engineering, knowledge management, and product innovation. *Journal of Operations and Strategic Planning*, *1*(2), 204-231.

Deshpande, R., Farley, J., & Webster, F. (1993). Corporate culture, customer orientation, and innovativeness in Japanese firms: A quadrant analysis. *Journal of Marketing*, *57*(1), 23-37.

Deslonde, V., & Becerra, M. (2018). The technology acceptance model (TAM): Exploring school counselors' acceptance and use of Naviance. *The Professional Counselor*, *8*(4), 369-382.

Di Paola, N., Spanò, R., Caldarelli, A., & Vona, R. (2017). Hi-tech startups: Legitimacy challenges and funding dynamics. *Technology Analysis & Strategic Management*, *30*(3), 363-375.

Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method* (2nd ed.). Hoboken, NJ: John Wiley & Sons Inc.

Drejer, A., & Riis, J. (1999). Competence development and technology: How learning and technology can be meaningfully integrated. *Technovation, 19*(10), 631-644.

Drost, E. (2011). Validity and reliability in social science research. *Education Research Perspectives, 38*(1), 105-123.

Du, S., Yalcinkaya, G., & Bstieler, L. (2016). Sustainability, social media driven open innovation, and new product development performance. *Journal of Product Innovation Management*, *33*(S1), 55-71.

Dyrenfruth, M. (1990). Technological literacy: Characteristics and competencies, revealed and detailed. *Technology and school: Report of the PATT conference*, 26-50.

Elder-Vass, D. (2010). *The causal powers of social structures: Emergence, structure and agency*. Cambridge: Cambridge University Press.

Fagerberg, J. (2004). Innovation: A guide to the literature. In Fagerberg J., Mowery D., & Nelson R. (eds), *The Oxford handbook of innovation* (pp. 1-26). Oxford: Oxford University.

Farinha, L., Ferreira, J., Nunes, S., & Ratten, V. (2017). Conditions supporting entrepreneurship and sustainable growth. *International Journal of Social Ecology and Sustainable Development*, *8*(3), 67-86.

Federal Republic Nigeria. (2011). *Department of Science, Technology and Innovation (STI) Policy*. Retrieved from https://workspace.unpan.org/sites/internet/Documents/UNPAN048879.pdf

Fernandes, K., Raja, V., White, A., & Tsinopoulos, C. (2006). Adoption of virtual reality within construction processes: A factor analysis approach. *Technovation, 26*(1), 111-120.

Forbes. (2018). *These are the top African Tech startups you need to know about.* Retrieved from https://www.forbes.com/sites/montymunford/2017/10/18/these-are-the-top-african-tech-startups-you-need-to-know-about/#4be4e3b74161

Fust, A., Wustrow, P., & Fueglistaller, U. (2017). Why do entrepreneurs search for information about opportunities the way they do? *Academy of Management Proceedings*, *2017*(1), 13671.

Gachanja, I., Nga'nga S., & Kiganane, L. (2020). Influence of organization learning on innovation output in manufacturing firms in Kenya. *International Journal of Innovation Studies*, 4(2020) 16-26.

Galeazzo, A., & Furlan, A. (2019). Good problem solvers? Leveraging knowledge sharing mechanisms and management support. *Journal of Knowledge Management*, *23*(6), 1017-1038.

Ganzer, P., Chais, C., & Olea, P. (2017). Product, process, marketing and organizational innovation in industries of the flat knitting sector. *Innovation and Management Review, 14*(1), 321-332.

García-García, R., García-Canal, E., & Guillén, M. (2017). Rapid internationalization and long-term performance: The knowledge link. *Journal of World Business*, *52*(1), 97-110.

Gautier, L., Tosun, J., De Allegri, M., & Ridde., V. (2018). How do diffusion entrepreneurs spread policies? Insights from performance-based financing in Sub-Saharan Africa. *Journal of World Development, 110*(1), 160-175.

Ghana Ministry of Environment, Science and Technology. (2009). *National Science, Technology and Innovation Policy*. Retrieved from https://newsGhana.com.gh/wp.../nationalsciencetechnologyandinnovationpolicydraft4.pdf.

Giles, C. (2018). *Record-breaking $560m for African tech startups in 2017, says report.* Retrieved from https://edition.cnn.com/2018/02/23/africa/increase-investment-african-tech-startup/index.html

Gnekpe, C., & Coeurderoy, R. (2017). The impact of internal and external technology sourcing on innovation performance: a review and research agenda. *International Journal of Technology Management*, *73*(1/2/3), 21-38.

Goedhuys, M., & Sleuwaegen, L., (2010). High-growth entrepreneurial firms in Africa: A quantile regression approach. *Small Business Economics,* 34(1), 31-51.

Gorski, P. (2008). The ECPRES Model: A critical realist approach to causal mechanisms in the social sciences. *The Frontiers of Sociology,* 1(1), 147-94.

Greener, S. (2008). *Business research methods*. London: Ventus Publishing.

Gremme, K., & Wohlgemuth, V. (2017). Dynamic capabilities: A systematic literature review of theory and practice. *European Journal of Management Issues*, *25*(1), 30-35.

Grillitsch, M., & Nilsson, M. (2013). *Technological competencies and firm performance: Analyzing the importance of internal and external competencies*. Papers in Innovation Studies 2013/24. Sweden: Lund University, Center for Innovation, Research and Competences in the Learning Economy (CIRCLE).

Grinstein, A. (2008). The relationships between market orientation and alternative strategic orientations: A meta-analysis. *European Journal of Marketing, 42*(2),115-134.

Grinstein, A., & Goldman, A. (2006). Characterizing the technology firm: an exploratory study. *Journal of Research Policy, 35*(1),121-143.

Gritzo, L., Fusfeld, A., & Carpenter, D. (2017). Success factors in R&D leadership. *Research-Technology Management*, *47*(4), 43-51.

Grush, M. (2016). *Mixed reality: From the design lab to the professions*. Woodland Hills, CA: Campus Technology.

Hadrawi, H. (2019). The impact of firm supply performance and lean processes on the relationship between supply chain management practices and competitive performance. *Uncertain Supply Chain Management*, *7*(2), 341-350.

Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate data analysis* (6th ed.). New Jersey, USA: Pearson Prentice-Hall.

Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate data analysis* (6th ed.). New Jersey, USA: Pearson Prentice Hall.

Hair, J., Hult, G., Ringle, C., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Los Angeles, USA: Sage Publications.

Hakala, H. (2011). Strategic orientations in management literature: Three approaches to understanding the interaction between market, technology, entrepreneurial and learning orientations. *International Journal of Management Reviews, 13*(1), 199-217.

Hall, E. (2018). Grasping the nettle of 'doctorateness' for practitioner academics: A framework for thinking critically about curriculum design. *Studies in Continuing Education*, *41*(2), 157-172.

Hambrick, D., & Mason, P. (1984). Upper echelons – The organization as are reflection of its top managers. *Academy of Management Review*, *9*(2), 193-206.

Hammer, J., & Pivo, G. (2016). The triple bottom line and sustainable economic development theory and practice. *Economic Development Quarterly*, *31*(1), 25-36.

Han, C., & Gao, S. (2019). A chain multiple mediation model linking strategic, management, and technological innovations to firm competitiveness. *Review of Business Management*, *21*(4), 879-905.

Helfast, C., Raubitschek, R. (2018). Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems*. Journal of Research Policy, 47*(2018), 1391-1399.

Henriksen, D., Richardson, C., & Shack, K. (2020). Mindfulness and creativity: Implications for thinking and learning. *Thinking Skills and Creativity*, *37*, 15-33.

Hernández Linares, R., & López Fernandez, M. (2020). Entrepreneurial orientation, learning orientation, market orientation, and organizational performance: Family firms versus non-family firms. *European Journal of Family Business*, *10*(1), 6-19.

Hertzog, M. (2008). Considerations in determining sample size for pilot studies. *Research in Nursing & Health*, *31*,180-191.

Hiebl, M. (2017). Finance managers in family firms: an upper-echelons view. *Journal of Family Business Management*, *7*(2), 207-220.

Ho, S., & Odhiambo, N. (2015). Stock market performance in Hong Kong: An exploratory review. *Asian-Pacific Economic Literature, 29*(1), 47-61.

Holtskog, H. (2015). Forms of innovation—Insights from product development. *Journal of The Knowledge Economy*, *8*(1), 63-76.

Hsu, B., & Chen, Y. (2019). Industrial policy, social capital, human capital, and firm-level competitive advantage. *International Entrepreneurship and Management Journal*, *15*(3), 883-903.

Huang, K. (2011). Technology competencies in competitive environment. *Journal of Business Research, 64*(2), 172-179.

Hussinger, K. (2010). On the importance of technological relatedness: SMEs versus large acquisition targets. *Technovation*, *31*(1), 190-202.

Igboke, A. (2019). Enhancing national security through internet broadcasting: Benefits and limitations. *Skhid*, *5*(163), 41-47.

Ince, H., Imamoglu, S., & Turkcan, H. (2016). The effect of technological innovation capabilities and absorptive capacity on firm innovativeness: A conceptual framework. *Journal of Social and Behavioural Sciences,* 23(2016), 764-770.

Insead, World Intellectual Property Organization (WIPO) & Cornell University. (2016). *The Global Innovation Index*. Fontainebleau: Insead Business School.

Ireland, R., Covin, J., & Kuratko, D. (2009). Conceptualizing corporate entrepreneurship strategy. *Entrepreneurship Theory and Practice, 33*(1), 19-46.

ITU, International Telecommunications Union. (2020). Measuring digital development: Facts and figures 2020. Retrieved from: https://www.itu.int/en/ITUD/Statistics/Documents/facts/FactsFigures2020.pdf

Kabiri, S., Shadmanfaat, M. S., Smith, H., & Cochran, J. (2020). Aggression in soccer fan's: A test of Akers' social learning theory. *Deviant Behaviour*, 1-14. Retrieved from https://doi.org/10.1080/01639625.2020.1763119

Kashirin, A. (2018). Algorithm of identification and search for new market applications of unique technological competences. *European Research Studies Journal*, *XXI*(4), 119-128.

Kashmoola, B., Ahmad, F., & Kheng, Y. (2017). Review on job satisfaction, intention to leave and corporate entrepreneurial characteristics in United Arab Emirates' construction firms. *International Journal of Emerging Research in Management and Technology*, *6*(10), 105.

Kassema, J. (2020). ICT innovation and creativity: Organizational internal and external stimulus factors. *SSRN Electronic Journal*, 1-32.

Kazeem, Y. (2018). *Startup venture funding jumped more than 50% in Africa last year to a record high.* Retrieved from https://qz.com/africa/1211233/how-much-did-african-startups-raise-in-2017-partech-disrupt-africa/

Khobai, H., Hamman, N., Mkhombo, T., Mhaka, S., Mavikela, N., & Phiri, A. (2018). The FDI-growth nexus in South Africa: A re-examination using quantile regression approach. *Studia Universitatis Babes-Bolyai Oeconomica*, *63*(3), 33-55.

Kim, C. (2016). Effects of export firm capabilities, export marketing strategy implementation effectiveness and export competitive advantage on export performance in Korean export firms. *Korean Corporation Management Review*, *23*(1), 131-154.

Kizito, R. (2016). Connectivism in learning activity design: Implications for pedagogically-based technology adoption in African higher education contexts. *The International Review of Research in Open and Distributed Learning*, *17*(2). Retrieved from https://doi.org/10.19173/irrodl.v17i2.2217

Knauer, T., Silge, L., & Sommer, F. (2018). The shareholder value effects of using value-based performance measures: Evidence from acquisitions and divestments. *Management Accounting Research, 41*(2018), 43-61.

Kock, A., & Gemünden, H. (2020). How entrepreneurial orientation can leverage innovation project portfolio management. *R&D Management*, 1-17. Retrieved from https://doi.org/10.1111/radm.12423.

Konrad, A., & Linnehan, F. (1995). Formalized HRM structures: coordinating equal employment opportunity or concealing organizational practice? *Academy of Management Journal,* 38(1), 787-820.

Lans, T., Verhees, F., & Verstegen, J. (2016). Social competence in small firms-fostering workplace learning and performance. *Human Resource Development Quarterly*, *27*(3), 321-348.

Lau, A., & Lo, W. (2019). Absorptive capacity, technological innovation capability and innovation performance: An empirical study in Hong Kong. *International Journal of Technology Management*, *80*(1/2), 107. DOI: 10.1504/IJTM.2019.10021421

Lau, C., & Bruton, G. (2011). Strategic orientations and strategies of high technology ventures in two transition economies. *Journal of World Business, 46*(3), 371-380.

Layton, D. (1994). A school subject in the making? The search for fundamentals. In D. Layton (ed.), *Innovations in science and technology education* (Vol. 5). Paris: Unesco.

Linton, G., & Kask, J. (2017). Configurations of entrepreneurial orientation and competitive strategy for high performance. *Journal of Business Research, 70*(1), 168-176.

Liquid Telecom. (2017). *African Internet of Things Report 2017.* Retrieved from https://www.liquidtelecom.com/information-centre/innovation-blog/internet-of-things

Lochner, F. (2011). *The functionality grid as paradigm for Management of Technology.* Unpublished PhD-dissertation. Stellenbosch, RSA: University of Stellenbosch.

López Sáez, P., Martín de Castro, G., Garcia Muina, F., & Navas López, J. (2005). A proposal for identification of firm technological competences. *International Journal of Management Practice, 1*(4), 374-387.

López, A., Neves, P., & Cunha, M. (2019). A high-growth firm contingency test of the formalization-performance relationship. *Journal of Small Business Management*, *57*(2), 374-396.

Lucas, W., Cooper, S., Ward, T., & Cave, F. (2009). Industry placement, authentic experience and the development of venturing and technology self-efficacy. *Technovation, 29*(11), 738-752.

Ma, H., Liu, T., & Karri, R. (2016). Internal corporate venturing. *Organizational Dynamics*, *45*(2), 114-123.

Mackenzie, J. (2017). Rodgers on calls for observable verbs. *Educational Philosophy and Theory, 50*(1), 18-27.

Maddison Warren, A. (2016). Increasing the value of research: A comparison of the literature on critical success factors for projects, IT projects and enterprise resource planning projects. *Systems*, *4*(4), 33. Retrieved from https://doi.org/10.3390/systems4040033

Malhotra, N. (2015). *Qualitative and quantitative approaches to theory development and testing*. A research workshop hosted by The Southern Africa Institute for Management Sciences (SAIMS), University of Cape Town, RSA.

Mandal, P., & Bagchi, K. (2016). Strategic role of information, knowledge and technology in manufacturing industry performance. *Industrial Management & Data Systems*, *116*(6), 1259-1278.

Mandysová, I. (2018). A behavioural theory of the firm: specifics of Czech entrepreneurial behaviour. *E+M Ekonomie a Management*, *21*(1), 85-100.

Marino, K. (1996). Developing consensus on firm competencies and capabilities. *Academy of Management Executive, 10*(3), 40-51.

Martens, C. D. P., Machado, F. J., Martens, M. L., De Oliveira e Silva, F. Q. P., & De Freitas, H. M. R. (2018). Linking entrepreneurial orientation to project success. *International Journal of Project Management*, *36*(1), 255-266.

Martens, C., Lacerda, F., Belfort, A., & Freitas, H. (2016). Research on entrepreneurial orientation: Current status and future agenda. *International Journal of Entrepreneurial Behaviour & Research, 22*(4), 556-583. DOI: 10.1108/IJEBR-08-2015-0183

Martens, M., & Carvalho, M., (2016). The challenge of introducing sustainability into project management function: Multiple-case studies. *Journal of Clean Production*, 117(1), 29-40.

Martín de Castro, G., Delgado Verde, M., Navas López, J., & Cruz Gonzalez, J. (2013). The moderating role of innovation culture in the relationship between knowledge assets and product innovation. *Technological Forecasting & Social Change, 80*(2), 351–363.

Martin Rojas, R., Garcia Morales, V., & Bolivar Ramos, M. (2013). Influence of technological support, skills and competencies and learning on corporate entrepreneurship in European technology firms. *Technovation, 33*(1), 417-430.

Martín Rojas, R., García Morales, V., & García Sánchez, E. (2011a). The influence on corporate entrepreneurship of technological variables. *Industrial Management and Data Systems, 111*(7), 984-1005.

Martín Rojas, R., García Morales, V., & Mihi Ramírez, A. (2011b). How can we increase Spanish technology firms' performance? *Journal of Knowledge Management, 15*(5), 759-778.

Martín-Rojas, R., Fernández-Pérez, V., & García-Sánchez, E. (2016). Encouraging organizational performance through the influence of technological distinctive competencies on components of corporate entrepreneurship. *International Entrepreneurship and Management Journal*, *13*(2), 397-426.

Marx, K. (1953). The confessions of Karl Marx. *Monthly Review*, *4*(11), 401. Retrieved from https://doi.org/10.14452/mr-004-11-1953-03_3

Ma'toufi, A. R., & Tajeddini, K. (2015). The impact of learning orientation on entrepreneurial orientation and innovation in small-sized business firms. *Middle East Journal of Management*, *2*(3), 252-267.

Mazouni, M. (2018). Strategic financial management global technology - Case study. *International Journal of Economics & Management Sciences*, *7*(4), 1-4. Retrieved from https://www.hilarispublisher.com/open-access/strategic-financial-management-global-technology--case-study-2162-6359-1000538.pdf

Medcof, J. (2017). Leadership development: Towards a more systematic approach in technology management. *Journal of High Technology Management Research*, *28*(1), 167-178.

Mehta, R., & Talwar, S. (2019). Inferring causal relations among key change management variables: A structural equation modelling approach. *International Journal of Indian Culture and Business Management*, *18*(2), 152-183.

Mendi, P., & Costamagna, R. (2017). Managing innovation under competitive pressure from informal producers. *Technological Forecasting and Social Change*, *114*(C), 192-202.

Meule, A., Richard, A., & Blechert, J. (2018). Trait and state chocolate craving, hunger, and implicit chocolate preference: A moderated mediation model. *Appetite*, *123*, 464. DOI: 10.1016/j.appet.2017.11.064

Miles, M., & Covin, J. (2002). Exploring the practice of corporate venturing: some common forms and their organizational implications. *Entrepreneurship: Theory & Practice, 26*(3), 21-40.

Miller, D. (1983). The correlates of entrepreneurship in three types of firms. *Journal of Management Science, 29*(7), 770-791.

Minaev. A. (2021). Startup Statistics (2021): 35 Facts and Trends You Must Know. Retrieved from https://firstsiteguide.com/startup-stats/

Monteiro, A., Soares, A., & Rua, O. (2019). Linking intangible resources and entrepreneurial orientation to export performance: The mediating effect of dynamic capabilities. *Journal of Innovation & Knowledge*, *4*(3), 179-187.

Moon, C. (2016). The impact of technological innovation orientation and technological innovation capabilities on technological innovation performance. *Korean Corporation Management Review*, *23*(6), 47-72.

Morgan, N., Katsikeas, C., Vorhies, D. (2012). Export marketing strategy implementation, export marketing capabilities, and export venture performance. *Journal of the Academy of Marketing Science, 40,* 271-289.

Mullens, D. (2018). Entrepreneurial orientation and sustainability initiatives in family firms. *Journal of Global Responsibility*, *9*(2), 160-178.

Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship Theory and Practice*, *41*(6), 1029-1055.

Narayan, S., & Volberda, H. (2017). Understanding managerial antecedents of business model innovation. *Academy of Management Proceedings*, *2017*(1), 16573. Retrieved from https://doi.org/10.5465/AMBPP.2017.16573

Narula, R., Asmussen, C., Chi, T., & Kundu, S. (2019). Applying and advancing internalization theory: The multinational enterprise in the twenty-first century. *Journal of International Business Studies*, *50*(1), 1231-1252.

Ndemezo, E., & Kayitana, C. (2018). Corporate governance, corporate entrepreneurship and firm performance: Evidence from the Rwandese manufacturing industry. *Indian Journal of Corporate Governance*, *11*(2), 103-121.

Newbert, S., Gopalakrishnan, S., & Kirchhoff, B. (2008). Looking beyond resources: Exploring the importance of entrepreneurship to firm-level competitive advantage in technologically intensive industries. *Technovation, 28*(1), 6-19.

Newbert, S., Kirchhoff, B., & Walsh, S. (2007). Defining the relationship among founding resources, strategies, and performance in technology-intensive new ventures: evidence from the semiconductor Silicon industry. *Journal of Small Business Management, 45*(4), 438–466.

Noori, J., Bagheri Nasrabadi, M., Yazdi, N., & Babakhan, A. (2017). Innovative performance of Iranian knowledge-based firms: Large firms or SMEs? *Technological Forecasting and Social Change*, *122*(2017), 179-185.

Olufunke, D. (2020). How technological innovation mediates between strategic CSR and SMES performance in manufacturing sector: Evidence from Malaysian manufacturing sector. *International Journal of Psychosocial Rehabilitation*, *24*(5), 1225-1233.

Omerzel, D., & Antoncic, B. (2008). Critical entrepreneur knowledge dimensions for the SME performance. *Industrial Management & Data Systems, 108*(9), 1182-1199.

Osabutey, E., & Croucher, R. (2018). Intermediate institutions and technology transfer in developing countries: The case of the construction industry in Ghana. *Technological Forecasting and Social Change*, *128*(C), 154-163.

Padula, G., Novelli, E., & Conti, R. (2015). SMEs inventive performance and profitability in the markets for technology. *Technovation*, *41*(1), 38-50.

Pakura, S. (2020). Open innovation as a driver for new organisations: a qualitative analysis of green-tech startups. *International Journal of Entrepreneurial Venturing*, *12*(1), 109-142.

Paladino, A. (2007). Investigating the drivers of innovation and new product success: A Comparison of strategic orientations. *Journal of product innovation management, 63*(1), 534-553.

Pantano, E., & Vannucci, V. (2019). Who is innovating? An exploratory research of digital technologies diffusion in retail industry. *Journal of Retailing and Consumer Services, 49*(C), 297-304.

Paradkar, A., Knight, J., & Hansen, P. (2015). Innovation in startups: Ideas filling the void or ideas devoid of resources and capabilities? *Technovation*, *41*(1), 1-10.

Partech Ventures. (2019). 2019 Africa Tech Venture Capital Report. Retrieved from https://partechpartners.com/documents/12/2020.01_Partech_Africa_-_2019_Africa_Tech_VC_Report_FINAL.pdf.

Patel, P., Kohtamäki, M., Parida, V., & Wincent, J. (2015). Entrepreneurial orientation-as-experimentation and firm performance: The enabling role of absorptive capacity. *Strategic Management Journal*, *36*(1), 1739-1749.

Pedroncelli, P. (2018). *African tech startups have already raised more capital this year than in 2017*. Retrieved from https://moguldom.com/150953/african-tech-startups-have-already-raised-more-capital-this-year-than-in-2017/.

Péréa, C., & Von Zedtwitz, M. (2018). Organic vs. mechanistic coordination in distributed new product development (NPD) teams. *Journal of Engineering and Technology Management*, *49*, 4-21.

Petzold, N., Landinez, L., & Baaken, T. (2019). Disruptive innovation from a process view: A systematic literature review. *Creativity and Innovation Management*, *28*(2), 157-174.

Polák, P. (2017). The productivity paradox: A meta-analysis. *Information Economics and Policy*, *38*(C), 38-54.

Poole, B. (2015). The rather elusive concept of 'doctorateness': A reaction to Wellington. *Studies in Higher Education*, *40*(9), 1507-1522.

Prahalad, C., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review, 68*(3), 79-91.

PricewaterhouseCoopers (PwC). (2019). *Insights from the entertainment and media outlook: 2019-2023 – An African perspective.* Retrieved from https://www.pwc.co.za/en/assets/pdf/entertainment-and-media-outlook-2019-2023.pdf

Putri, W., Nurwiyanta, N., Sungkono, S., & Wahyuningsih, T. (2019). The emerging fintech and financial slack on corporate financial performance. *Investment Management and Financial Innovations, 16*(2), 348-354.

Quartz Africa. (2018). *Africa's fintech industry has scored another big-ticket investment win*. Retrieved from https://qz.com/africa/1277155/africa-fintech-cellulant-raises-47-5-million-from-tpg-growths-rise-fund/

Rauch, A., Wiklund, J., Lumpkin, G., & Frese, M. (2009). Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrepreneurship: Theory and Practice*, *33*(1), 761-787.

Ray, G., Muhanna, W., & Barnety, J. (2005). Information technology and the performance of the customer service process: A resource-based analysis. *MIS Quarterly, 29*(4), 625-652.

Raynard, M. (2017). Understanding academic e-books through the diffusion of innovations theory as a basis for developing effective marketing and educational strategies. *The Journal of Academic Librarianship, 43*(1), 82-86.

Real, J., Leal, A., & Roldan, J. (2006). Information technology as a determinant of organizational learning and technological distinctive competencies. *Industrial Marketing Management*, *35*(1), 505-521.

Republic of Kenya (2008). *Science, Technology and Innovation Policy*. Nairobi, Kenya: Department of Science and Technology.

Republic of South Africa (RSA). (2008). *Innovation towards a knowledge-based economy: Ten-year plan for South Africa (2008–2018).* Pretoria, RSA: Government Printer.

Rezaei, A., Allameh, S., & Ansari, R. (2018). Impact of knowledge creation and organisational learning on organisational innovation: an empirical investigation. *International Journal of Business Innovation and Research*, *16*(1), 117-133.

Ritchie, H., & Roser, M. (2017). *Technology adoption.* Retrieved from https://ourworldindata.org/technology-adoption#mobile-money-account-adoption

Rochman, B., & Peiper, H. (2017). Starbucks College Achievement Plan welcomes its 1,000th graduate. *Starbucks Stories and News*, 11 December. Retrieved from https://stories.starbucks.com/stories/2017/starbucks-college-achievement-plan-welcomes-its-1000th-graduate/

Romano, S., & Zabala-Iturriagagoitia, J. (2020). Davids versus Goliaths: Epigenetic dynamics and structural change in the Swedish innovation system. *Growth and Change: A Journal of Urban and Regional Policy,* 30 June. Retrieved from https://doi.org/10.1111/grow.12411

Ruiz-Jiménez, J. M., Fuentes-Fuentes, M. d. M, & Ruiz-Arroyo, M. (2014). Knowledge combination capability and innovation: The effects of gender diversity on top management teams in technology-based firms. *Journal of Business Ethics, 135*(3), 503-515.

Saidi, R. (2017). Karl Polanyi and Karl Marx assumptions on market economy. *SSRN Electronic Journal*. Retrieved from https://www.researchgate.net/publication/330345767_Karl_Polanyi_and_Karl_Marx_assumptions_on_Market_And_Capitalist_Economy

Sanders, K. (2018). Media review: Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based participatory research approaches. *Journal of Mixed Methods Research*, *13*(2), 263-265.

Scaringella, L., Miles, R., & Truong, Y. (2017). Customers involvement and firm absorptive capacity in radical innovation: The case of technological spin-offs. *Technological Forecasting and Social Change*, *120*(2017), 144-162.

Schaupp, M., & Virkkunen, J. (2017). Why a management concept fails to support managers' work: The case of the 'core competence of a corporation'. *Management Learning*, *48*(1), 97-109.

Schmitt, A., Rosing, K., Zhang, S., & Leatherbee, M. (2017). A dynamic model of entrepreneurial uncertainty and business opportunity identification: Exploration as a mediator and entrepreneurial self-efficacy as a moderator. *Entrepreneurship Theory and Practice*, *42*(6), 835-859.

Schumpeter, J. (1947). *Capitalism, socialism and democracy*. Cambridge, MA: Harvard University Press.

Schumpeter, J. (1942). The creative response in economic history. *Journal of Economic History, 7*(1), 149-159.

Schumpeter, J. (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.

Schuster, G., & Rueck, P. (2017). Innovation diffusion, licensing and corporate entrepreneurship - A conceptual review. *International Journal of Entrepreneurship and Innovation Management*, *21*(1/2), 119-142.

Seeber, S. (2016). Economic competencies and situation-specific commercial competencies: Reflections on conceptualization and measurement. *Citizenship, Social and Economic Education*, *15*(3), 162-182.

Şehbenderoğlu, Z. (2019). *Predicting the adoption of wearable health tracking devices: An application of diffusion of innovation theory*. Retrieved from https://ssrn.com/abstract=3427919

Sekliuckiene, J., & Sedziniauskiene, R. (2019). Entrepreneurial orientation and new venture performance: The moderating role of network types. *European Journal of International Management*, *1*(1), 1. Retrieved from DOI: 10.1504/EJIM.2019.10016904

Shaher, A., & Ali, K. (2020). The effect of entrepreneurial orientation on innovation performance: The mediation role of learning orientation on Kuwait SMEs. *Management Science Letters*, *10*(2020), 3811-3820.

Sheng, S., Zhou, K., & Li, J. (2011). The effects of business and political ties on firm performance: evidence from China. *Journal of Marketing, 75*(1), 1-15.

Singh, S., Bhowmick, B., Eesley, D., & Sindhav, B. (2019). Grassroots innovation and entrepreneurial success: Is entrepreneurial orientation a missing link? *Journal of Technological Forecasting & Social Change,* 12(1), 1-20.

So, K., & Kang, J. (2014). Curriculum reform in Korea: Issues and challenges for twenty-first century learning. *The Asia-Pacific Education Researcher, 23*(4), 795-803. DOI: 10.1007/s40299-013-0161-2

Sok, P., O'Cass, A., & Sok, P. (2013). Achieving superior SME performance: Overarching role of marketing, innovation, and learning capabilities. *Australasian Marketing Journal*, *21*(3), 161-167.

Soleimanof, S., Singh, K., & Holt, D. (2018). Micro-foundations of corporate entrepreneurship in family firms: An institution-based perspective. *Entrepreneurship Theory and Practice*, *43*(2), 274-281.

Solow, R. (1974). The economics of resources or the resources of economics. *The American Economic Review*, 64(2), 1-15.

Spriggs, M. (2016). Shifting entrepreneurial thinking into high gear. *Entrepreneur and Innovation Exchange*, 1-3. DOI: 10.17919/X93K55

Stam, W., & Elfring, T. (2008). Entrepreneurial orientation and new venture performance: The moderating role of intra- and extra-industry social capital. *Academy of Management Journal, 51*(1), 97-111.

Startup Ranking. (2021). Startups per country. Retrieved from https://www.startupranking.com/countries

Steffens, K. (2015). Competences, learning theories and MOOCs: Recent developments in lifelong learning. *European Journal of Education*, *50*(1), 41-59.

Steinmetz, G. (1993). *Regulating the social: The welfare state and local politics in imperial Germany.* Princeton: Princeton University Press.

Sturdy, A., & O'Mahoney, J. (2018). Explaining national variation in the use of management consulting knowledge: A framework. *Management Learning*, *49*(5), 537-558.

Surdu, I., & Narula, R. (2020). *Organizational learning, unlearning and re-internationalization timing: Differences between emerging- versus developed-market MNEs*. Henley Discussion Paper No. JHD-2020-03. Johannesburg, SA: Henley Business School.

Surdu, I., Mellahi, K., Glaister, K. (2019). Once bitten, not necessarily shy? Determinants of foreign market re-entry commitment strategies. *Journal of International Business Studies, 50*(1), 393-422.

Swaiess, M., & Yamin, M. (2020). The influence of organizational and individual factors on organizational innovation with moderating role of innovation orientation. *International Journal of Business Innovation and Research*, *23*(1), 103-126.

Tae-Kyung, S. (2017). A study on standards supporting system for small and medium-sized enterprises (SMEs) innovation: Policy implications by analysing foreign cases. *Korean Public Management Review*, *31*(3), 239-261.

Tarim, T. (2015). Managing technical professionals: Why technical managers need people management skills. *IEEE Engineering Management Review*, *43*(2), 5-6.

Teece, D., Pisano, G., & Shuen, A. (1990). *Firm capabilities, resources and the concept of strategy*. Consortium on Competitiveness and Cooperation Working Paper. *Center for Research in Management*, University of California at Berkeley (pp. 90-99).

Teece, D., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509-533.

Teece, D. (2013). The new managerial economics of firm growth: the role of intangible assets and capabilities. In: Thomas, C.R., Shughart, W.F. (Eds.), The Oxford Handbook of Managerial Economics. Oxford University Press, Oxford, 278-301.

Teece, D. (2014). The foundations of enterprise performance: dynamic and ordinary capabilities in an (economic) theory of firms. *Journal of Academic Management Perspectives*, *28*(4), 328-352.

Teece, D. (2018). Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world. *Research Policy*, *47*(8), 1367-1387.

Theory Section. (2016). *What is critical realism?* Retrieved from http://www.asatheory.org/current-newsletter-online/what-is-critical-realism

Tidd, J., Bessant, J., & Pavitt, K. (2005). Managing innovation: Integrating technological, market and organizational change (3rd ed.). Chichester, West Sussex, England: John Wiley & Sons.

Tomczyk, D., Lee, J., & Winslow, E. (2013). Entrepreneurs' personal values, compensation, and high growth firm performance. *Journal of Small Business Management*, *51*(1), 66-82.

Trafford, V., & Leshem, S. (2009). Doctorateness as a threshold concept. *Innovations in Education and Teaching International, 46*(3), 305-316.

Tribe, K. (2008). Prophet of innovation: Joseph Schumpeter and creative destruction. *History of Political Economy*, *40*(4), 716-717. Retrieved from https://doi.org/10.1215/00182702-2008-033

Tripopsakul, S., & Charupongsopon, W. (2017). What skills do nascent entrepreneurs need? The Evidence from Thailand. *European Research Studies Journal*, *XX*(2A), 250-263.

Trochim, M. (2006). The research methods knowledge base. 2nd ed. Retrieved from <http://www.socialresearchmethods.net/kb/

Tseng, M., Lin, S. & Vy, T. (2012). Mediating effect of technology innovation capabilities investment capability and firm performance in Vietnam. *Social and Behavioural Sciences*, *40*(1), 817-829.

Tuluce, N., & Yurktur, A. (2015). Term of strategic entrepreneurship and Schumpeter's Creative Destruction Theory. *Journal of Social and Behavioural Sciences, 207*(2015), 720-728.

Urban, B. (2017). Corporate entrepreneurship in South Africa: The role of organizational factors and entrepreneurial alertness in advancing innovativeness. *Journal of Developmental Entrepreneurship*, *22*(3), 1-20.

Van Belle, G. (2002). *Statistical rules of thumb*. New York: John Wiley.

Vandenberghe, F. (2015). What´s critical about critical realism? London: Routledge.

Vaznyte, E., & Andries, P. (2019). Entrepreneurial orientation and startups' external financing. *Journal of Business Venturing,* 34(2019), 439-458.

Von Stamm, B. (2012). *Innovation leadership: Leadership for innovation*. Retrieved from: http://innovationleadershipforum.org/our-wisdom/innovation-leadership/

Voudouris, I., Lioukas, S., Iatrelli, M., Caloghirou, Y. (2012). Effectiveness of technology investment: Impact of internal technological capability, networking, and investment's strategic importance. *Journal of Technovation, 32*(6),400-414.

Wakama, A. S. (2017). Workman, D. (2017*). African* countries with the most tech hubs ranked. *IT News Africa,* 23 June. Retrieved from http://www.itnewsafrica.com/2017/06/african-countries-with-the-most-tech-hubs-ranked/

Walsh, S., & Linton, J. (2002). The measurement of technical competencies. *Journal of High Technology Management Research, 13*(1), 63-86.

Wang, C., & Ahmed, P. (2004). The development and validation of the organizational innovativeness construct using confirmatory factor analysis. *European Journal of Innovation Management, 7*(4), 303-313.

Watson, A., Dada, O., Wright, O., & Perrigot, R. (2017). Entrepreneurial orientation rhetoric in franchise organizations: The impact of national culture. *Entrepreneurship Theory and Practice*, *43*(4), 751-772.

Webb, J., Ireland, R., Hitt, M., Kistruck, G., & Tihanyi, L. (2011). Where is the opportunity without the customer? An integration of marketing activities, the entrepreneurship process, and institutional theory. *Journal of the Academy of Marketing Science 39*(4), 537–554.

WeeTracker. (2018). *African startups and VC ecosystem reports*. Retrieved from http://weetracker.com/demo/african-startups/?nm=confirmation&nk=879-9c1110adc3

Weiten, W. (2010). *Psychology themes and variations*. Belmont, CA: Wadsworth.

Wellington, J. (2013). Searching for 'doctorateness'. *Studies in Higher Education*, *38*(10), 1490-1503.

Welman, J. C., Kruger, F., & Mitchell, B. (2012). *Research methodology* (3rd ed.). Cape Town, South Africa: Oxford University Press.

White, P., & Molly, C. (2019). Developing consensus based competencies, in safe and effective antimicrobial use, for United Kingdom healthcare professional education. *Physiotherapy*, *105*(1), e108-e109.

Wiklund, J., & Shepherd, D. (2003). Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. *Journal of Strategic Management, 24*(13), 1307-1314.

Wójcik, P. (2015). Exploring links between dynamic capabilities perspective and resource-based view: A literature overview. *International Journal of Management and Economics*, *45*(1), 83-107.

Yazdani, S., & Shokooh, F. (2018). Defining doctorateness: a concept analysis. *International Journal of. Doctoral Studies, 13*, 31-48.

Yi, J. (2020). Financial flexibility, dynamic capabilities, and the performance of manufacturing enterprises. *Journal of Research in Emerging Markets*, *2*(2), 19-33.

Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *European Journal of Education, 48*(2), 1-16.

Yilmaz, Y. (2020). Modelling approaches for recognition of the strategic value of information management. *Öneri Dergisi*, 157-179. DOI: 10.14783/maruoneri.683479

Yoshitoshi, T. (2017). How we can define the required skills of Intellectual Property human resource in the future? *IT & Law Review*, *15*, 1-27.

You, Y., & Srinivasan, S., Pauwels, K., & Joshi, A. (2020). How CEO/CMO characteristics affect innovation and stock returns: Findings and future directions. *Journal of the Academy of Marketing Science, 6*, 1229-1253.

Yu, W., Wiklund, J., & Pérez-Luño, A. (2019). ADHD symptoms, entrepreneurial orientation (EO), and firm performance. *Entrepreneurship Theory and Practice*, 1(4), 225-239.

Zahra, S. (2008). The virtuous cycle of discovery and creation of entrepreneurial opportunities. *Strategic Entrepreneurship Journal*, *2*(1), 243-257.

Zainal, R. (2018). Creative and innovative management culture. *International Journal of Academic Research in Business and Social Sciences*, 8(7), 1165-1172.

Zhang, F., Wei, L., Sun, H., & Tung, L. (2019). How entrepreneurial learning impacts one's intention towards entrepreneurship. *Chinese Management Studies*, *13*(1), 146-170.

Zhang, J., Wong, P., & Ho, Y. (2016). Ethnic enclave and entrepreneurial financing: Asian venture capitalists in Silicon Valley. *Strategic Entrepreneurship Journal*, *10*(3), 318-335.

Zhang, M., Qi, Y., Wang, Z., Zhao X., & Pawar, K. (2019). Effects of business and political ties on product innovation performance: Evidence from China and India. *Technovation*, *42*(1), 1-10.

Zvavahera, P., Chigora, F., & Tandi, R. (2018). Entrepreneurship: An engine for economic growth. *International Journal of Academic Research in Business and Social Sciences*, *8*(11) 55-66.

APPENDICES

APPENDIX A: SURVEY INSTRUMENT

University of Stellenbosch

Questionnaire No:

01 March 2020

Dear participant,

I would hereby like to invite you to complete a survey about what your perceptions are around certain aspects of the organisation you currently work for. The purpose of this survey is to gain a better understanding of the startup you work for and the role management/leadership in your organisation plays therein.

My name is Ekenedilichukwu Onwu and I am a Ph.D. student at the University of Stellenbosch Business School and this survey forms part of my Ph.D. study. I'm conducting a study that seeks to understand what drives entrepreneurial orientation and innovation capabilities of internet-based startups across Africa. My student number is 21531781 and the research is supervised by Prof Elsamari Botha and Prof Marius Ungerer.

This study has been approved by the Research Ethics Committee: Humanities (REC: Humanities) at Stellenbosch University (Ref No. USB-2020-13362) and is conducted according to accepted national and international ethics principles.

The survey is anonymous and will be treated as highly confidential; response data cannot be linked back to a respondent and response data will only be analysed at an aggregate level. Please note that your participation is voluntary, and you are free to decline to participate in this survey.

If you have any questions or concerns about this study, please feel free to contact me on +27721957152 or via email at ken.onwu@gmail.com or my supervisors at elsamaribotha@gmail.com and mariusu@usb.ac.za.

RIGHTS OF RESEARCH PARTICIPANTS: You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development.

CONSENT

I hereby agree to participate in this research. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop participating at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that my participation will remain confidential.

○ I accept, acknowledge and consent to all that I have read above.

Kindly complete the survey by 20 June 2020.

It will not take you more than 15 minutes to complete the questionnaire.

Best regards

Ekenedilichukwu Gilbert Onwu

Click here to take the survey.

In order to ensure you qualify to participate in this study, please answer the following questions to the best of your knowledge.

Do you work for an internet-based startup company? In other words, do you work for a company in its early stages of development (0 to 7 years), whose primary product, service, or mode of doing business is largely online/digital?

○ **YES** ○ **NO**

Please indicate how strongly you agree or disagree with each of the following statements. If you are uncertain of the answer, select the "Don't know" option. Answer the questions according to how you CURRENTLY perceive the organisation you work in.	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
How supportive of the use of technology are the founders and top managers in the startups your work for?							
In general, top management cultivates technology project champions to help implement new technical projects.	1	2	3	4	5	6	7
In general, top management ensures adequate funding of technology research and development.	1	2	3	4	5	6	7
In general, top management restructures work processes to leverage technology opportunities in the organisation.	1	2	3	4	5	6	7
In general, top management facilitates technology transfer throughout the organisation.	1	2	3	4	5	6	7
How technologically skilled is your startup organisation?							
In general, the skills of the people in my organisation are superior to our closest competitors in terms of skillsets related to technical operating systems performance.	1	2	3	4	5	6	7
In general, the skills of the people in my organisation are superior to our closest competitors in terms of skillsets related to business applications software performance.	1	2	3	4	5	6	7
In general, the skills of the people in my organisation are superior to our closest competitors in terms of skillsets related to communications service efficiency.	1	2	3	4	5	6	7
In general, the skills of the people in my organisation are superior to our closest competitors in the application and execution of various software programming languages.	1	2	3	4	5	6	7
How much will to embrace technology does your startup organisation display?							

Please indicate how strongly you agree or disagree with each of the following statements. If you are uncertain of the answer, select the "Don't know" option. Answer the questions according to how you CURRENTLY perceive the organisation you work in.	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
My organisation has the will to obtain the latest information about the status and the progress of science and relevant technologies relevant to my industry.	1	2	3	4	5	6	7
My organisation has the will to generate advanced technological processes that are superior to my closest competitors.	1	2	3	4	5	6	7
My organisation has the will to assimilate existing technologies and useful innovations in new ways that are superior to my closest competitors.	1	2	3	4	5	6	7
How much technical knowledge does your startup organisation possess?							
My organisation has the knowledge to attract and retain its qualified scientific-technical staff.	1	2	3	4	5	6	7
My organisation has the knowledge to dominate, generate or absorb basic and key technologies.	1	2	3	4	5	6	7
My organisation possesses the knowledge needed to set up programs internally oriented towards research & development.	1	2	3	4	5	6	7
How much learning takes place in your startup organisation?							
In the last year to 3 years, my organisation has acquired and shared a lot of new and relevant knowledge that has given us a competitive advantage.	1	2	3	4	5	6	7
In the last year to 3 years, members in my organisation have acquired some critical capacities and skills that have given my organisation a competitive advantage.	1	2	3	4	5	6	7
In the last year to 3 years, the organisational improvements have been influenced fundamentally by new knowledge entering the organisation.	1	2	3	4	5	6	7

Please indicate how strongly you agree or disagree with each of the following statements. If you are uncertain of the answer, select the "Don't know" option. Answer the questions according to how you CURRENTLY perceive the organisation you work in.	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
In the last year to three years, I would describe my organisation as an organisation that always takes the time out to learn new things.	1	2	3	4	5	6	7
What is your startup organisation's appetite like for taking on risk?							
In general, the managers in my organisation have a strong appetite for high-risk projects and opportunities (with chances of very high return).	1	2	3	4	5	6	7
In general, the managers in my organisation believe that owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives.	1	2	3	4	5	6	7
In general, when confronted with decision-making situations involving uncertainty, my firm typically adopts an aggressive posture in order to maximise the probability of exploiting potential opportunities.	1	2	3	4	5	6	7
How proactive is your startup organisation?							
In general, my firm in comparison with its competitors, typically initiates actions and processes, which competitors then respond to and sometimes follow.	1	2	3	4	5	6	7
In general, my firm in comparison with its competitors, is very often the first business to introduce new product/services, administrative techniques, and operating technologies.	1	2	3	4	5	6	7
In general, my firm in comparison with its competitors, has a strong tendency to introduce novel ideas or products into the market and sometimes into new markets.	1	2	3	4	5	6	7
How innovative are the leaders & products/services in your startup organisation specifically?							
In general, the top managers of my firm favour a strong emphasis on research and development, technological leadership and small innovations constantly.	1	2	3	4	5	6	7

Please indicate how strongly you agree or disagree with each of the following statements. If you are uncertain of the answer, select the "Don't know" option. Answer the questions according to how you CURRENTLY perceive the organisation you work in.	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
In general, my firm launched a number of new, cutting-edge lines of products or services in the past 5 years.	1	2	3	4	5	6	7
In general, changes in products or services in my firm have usually been quite dramatic and shocked the market positively in the past 5 years.	1	2	3	4	5	6	7
How innovative is your startup organisation in creating new products and services?							
The quality of our new products and services is superior to that of our closest competitors.	1	2	3	4	5	6	7
The product design of our products and services (in terms of functionality and features) is superior to that of our competitors.	1	2	3	4	5	6	7
In general, my organisation has an advantage over its competitors in terms of the new products it offers.	1	2	3	4	5	6	7
In general, changes to our new products and services could be described as major in terms of their improvements in comparison to other competitors in the space.	1	2	3	4	5	6	7
In general, our new products and services incorporate a large body of technological knowledge that is superior to that of our competitors.	1	2	3	4	5	6	7
In general, the applications of our new products and services are totally different from the applications of our main competitors' products and services.	1	2	3	4	5	6	7
How innovative is your startup organisation in creating new processes internally?							
In general, my organisation is constantly reviewing and improving its business processes.	1	2	3	4	5	6	7
In general, my organisation changes product development methods at a great speed in comparison with its competitors.	1	2	3	4	5	6	7

Please indicate how strongly you agree or disagree with each of the following statements. If you are uncertain of the answer, select the "Don't know" option. Answer the questions according to how you CURRENTLY perceive the organisation you work in.	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
In the last year to three years, my company has developed and implemented many new management styles and approaches.	1	2	3	4	5	6	7
In general, when we cannot solve a problem using conventional methods, we improvise using new methods.	1	2	3	4	5	6	7
How innovative is your startup organisation when it comes to marketing?							
Our marketing team is constantly improving its campaigns and messaging to stay ahead of the market.	1	2	3	4	5	6	7
Our marketing team tries to find new and exciting ways to build and improve relationships with our customers.	1	2	3	4	5	6	7
Our marketing and sales techniques are always revised, and we are always trying to find new methods of promoting our products and services to our customers.	1	2	3	4	5	6	7
Our marketing team does not only conceptualise our marketing ideas, but we also implement new and innovative marketing initiatives.	1	2	3	4	5	6	7
Our marketing team is constantly looking for new and creative ways to communicate and position the firm's products and services.	1	2	3	4	5	6	7
Our marketing team is constantly looking for new and creative ways to improve the firm's relationship with its suppliers.	1	2	3	4	5	6	7
How innovative is your startup organisation as a whole?							
My organisation as a whole, is constantly innovating and discovering with new opportunities to exploit.	1	2	3	4	5	6	7
My organisation as a whole, is constantly developing and executing new behaviours and innovative ways of working.	1	2	3	4	5	6	7
My organisation as a whole, is constantly innovating and coming up with new products and/or services to launch.	1	2	3	4	5	6	7

Please indicate how strongly you agree or disagree with each of the following statements. If you are uncertain of the answer, select the "Don't know" option. Answer the questions according to how you CURRENTLY perceive the organisation you work in.	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
My organisation as a whole, is constantly innovating and embracing new technologies.	1	2	3	4	5	6	7
My organisation as a whole, is constantly innovating and coming up with new administrative practices to develop, utilise and execute.	1	2	3	4	5	6	7
Relative to your main competitors, what is the perception of your firm's performance in the last year to three years in the following areas?							
My organisation's performance measured by user/customer growth has been superior to that of its main competitors.	1	2	3	4	5	6	7
My organisation's performance measured by financial investment has been superior to that of its main competitors.	1	2	3	4	5	6	7
My organisation's performance measured by revenue has been superior to that of its main competitors.	1	2	3	4	5	6	7
My organisation's performance measured by customer market share has been superior to that of its main competitors.	1	2	3	4	5	6	7
My organisation's performance measured by sales of its main products and services has been superior to that of its main competitors.	1	2	3	4	5	6	7

Please answer the following questions by ticking the appropriate box:

1.	How old are you?	<20		20-29		30-39		40-49		50-59		>60

2.	Which of these countries do you currently work in?	South Africa		Nigeria		Ghana		Kenya

3.	What is the size of your organisation in terms of number of employees?	<10		10-50		51-200		>200

4.	What level of the organisation is your role classified as?	CEO/Executive		Senior/Top-Level Management		Mid-level Management		Lower Level Management

5. To the best of your knowledge, which of these bests describe your organisation's main source of funding?

Crowd Funded Competitions		Angel Investors Bank Loans		Venture Capitalist Corporate Partners		Incubators or Accelerators Government		Self-Funded or Bootstrapping	

Please answer the following questions by ticking the appropriate box:

6.	Have you worked in any other startups besides this one?	Yes		No	
7.	Are you surrounded by other startups? In other words, do you work on a tech campus or tech hub?	Yes		No	
8.	Do you experience challenges with internet connectivity and/or internet speeds at work that directly affects the work you do?	Yes		No	
9.	Do you experience challenges with electricity/power at work that directly affects the work you do?	Yes		No	
10.	Did your CEO/Founder obtain an education overseas i.e. in a non-local institution?	Yes		No	

11.	What level of education has your CEO/Founder attained?	Diploma		Degree		Honours		Masters		PhD/Dr and above	

Thank you for your time. Enjoy the rest of your day!

APPENDIX B: HYPOTHESIZED MODEL & STRUCTURAL MODEL

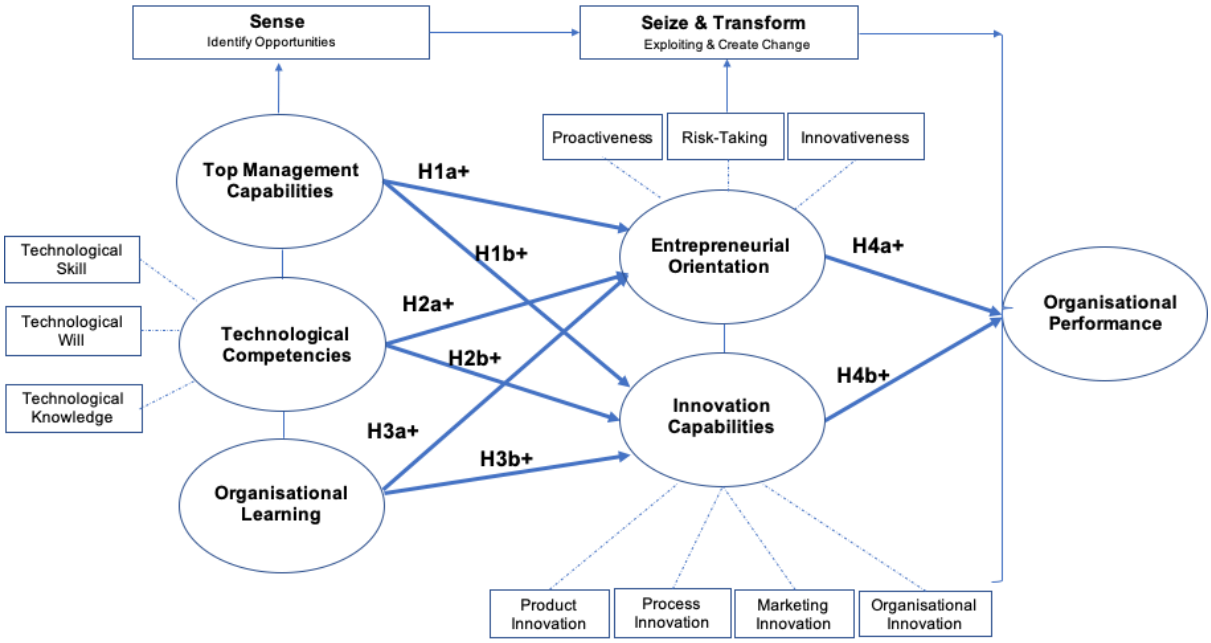


Figure A: Hypothesized model

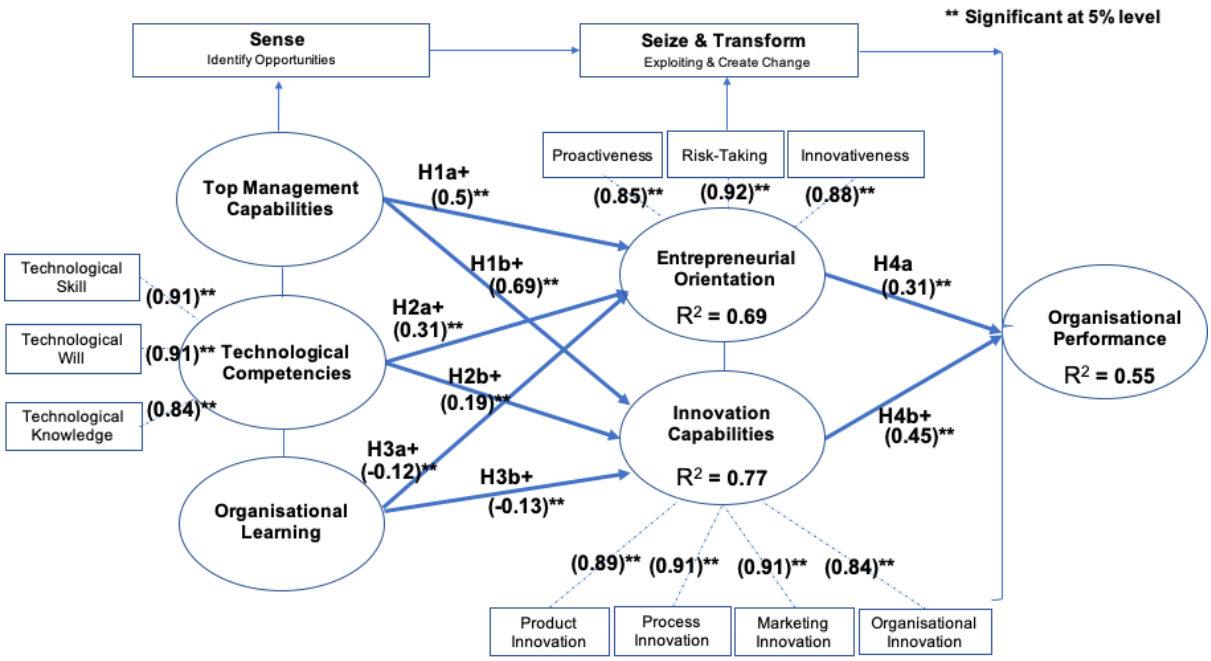


Figure B: Structural model

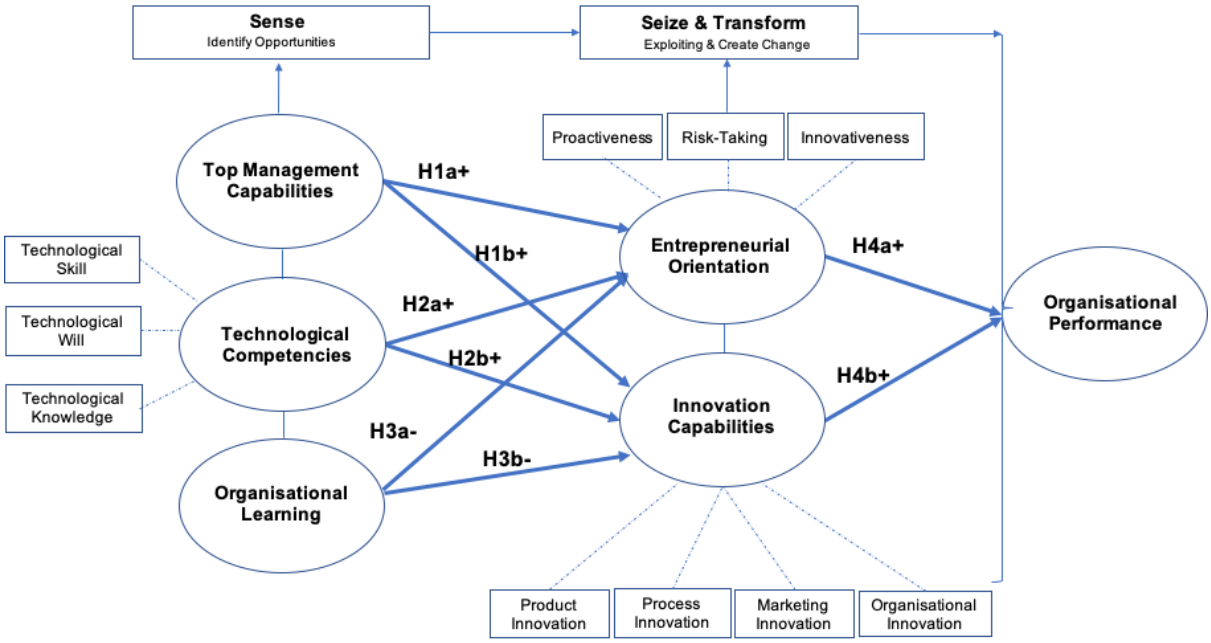


Figure C: Comprehensive SST dynamic capabilities model for performance development in tech startups

APPENDIX C: MAIN SURVEY RESULTS

Table 1: Current role in startup

Other descriptive results	Frequency	Percent
Have you worked in any other startups besides this one?	153	60%
Are you surrounded by other startups? In other words, do you work on a tech campus or tech hub?	131	52%
Do you experience challenges with internet connectivity and/or internet speeds at work that directly affect the work you do?	180	71%
Do you experience challenges with electricity/power at work that directly affect the work you do?	154	61%

Table 2: Reliability of scale for Top Management Capabilities (TMC)

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TMC1	16.08	23.622	0.920	0.859	0.93
TMC2	16.11	24.367	0.922	0.858	0.93
TMC3	16.13	24.029	0.918	0.845	0.93
TMC4	16.14	24.162	0.900	0.816	0.94

Table 3: Reliability of scale for Technological Competence (TC) – Skill

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TCS1	17.12	14.930	0.800	0.662	0.90
TCS2	17.12	14.950	0.850	0.739	0.88
TCS3	17.11	14.960	0.814	0.685	0.89
TCS4	17.47	14.938	0.788	0.625	0.90

Table 4: Reliability of scale for Technological Competence (TC) – Will

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TCW1	11.57	6.365	0.790	0.630	0.85
TCW2	11.71	6.310	0.815	0.666	0.82
TCW3	11.56	6.928	0.764	0.586	0.87

Table 5: Reliability of scale for Technological Competence (TC) – Knowledge

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TCK1	11.14	6.415	0.776	0.636	0.80
TCK2	11.25	6.980	0.796	0.653	0.78
TCK3	11.35	6.710	0.694	0.483	0.87

Table 6: Reliability of scale for Technological Competence (TC)– Overall

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TCS1	51.41	101.847	0.726	0.679	0.93
TCS2	51.41	101.040	0.798	0.752	0.92
TCS3	51.40	99.988	0.812	0.725	0.92
TCS4	51.76	101.187	0.743	0.642	0.93
TCW1	51.38	101.778	0.747	0.662	0.93
TCW2	51.52	100.124	0.822	0.731	0.93
TCW3	51.37	103.442	0.739	0.622	0.93
TCK1	51.50	102.417	0.701	0.682	0.93
TCK2	51.61	105.764	0.652	0.666	0.93
TCK3	51.70	101.727	0.710	0.572	0.93

Table 7: Reliability of scale for Organisational Learning (OL)

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
OL1	15.47	25.404	0.887	0.806	0.94
OL2	15.51	25.247	0.934	0.877	0.93
OL3	15.54	25.625	0.879	0.793	0.94
OL4	15.33	26.301	0.851	0.728	0.95

Table 8: Reliability of scale for Entrepreneurial Orientation (EO) – Risk Taking

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
EORT1	10.99	7.771	0.759	0.590	0.83
EORT2	10.88	7.847	0.802	0.645	0.80
EORT3	10.96	7.971	0.736	0.549	0.85

Table 9: Reliability of scale for Entrepreneurial Orientation (EO) – Proactiveness

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
EOP1	10.30	9.263	0.702	0.495	0.85
EOP2	10.67	8.411	0.751	0.576	0.80
EOP3	10.57	8.223	0.777	0.608	0.78

Table 10: Reliability of scale for Entrepreneurial Orientation (EO) – Innovativeness

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
EOI1	10.62	8.647	0.757	0.577	0.85
EOI2	10.81	8.120	0.804	0.647	0.81
EOI3	10.99	8.399	0.769	0.598	0.84

Table 11: Reliability of scale for Entrepreneurial Orientation (EO) overall

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
EORT1	42.98	99.920	0.685	0.608	0.92
EORT2	42.86	100.151	0.712	0.674	0.92
EORT3	42.95	99.709	0.699	0.585	0.92
EOP1	42.93	98.624	0.735	0.573	0.92
EOP2	43.30	97.580	0.718	0.589	0.91
EOP3	43.20	95.012	0.806	0.696	0.91
EOI1	42.81	98.367	0.744	0.628	0.92
EOI2	43.00	98.842	0.703	0.670	0.92
EOI3	43.18	97.601	0.754	0.657	0.92

Table 12: Reliability of scale for Innovation Capabilities (IC) – Product Innovation

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ICPROD1	26.72	48.185	0.851	0.798	0.942
ICPROD2	26.80	48.306	0.860	0.813	0.941
ICPROD3	26.65	48.118	0.894	0.820	0.937
ICPROD4	26.70	49.735	0.875	0.793	0.940
ICPROD5	26.80	49.028	0.865	0.782	0.941
ICPROD6	26.83	50.613	0.760	0.617	0.953

Table 13: Reliability of scale for Innovation Capabilities (IC) – Process Innovation

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ICPROC1	16.61	14.839	0.758	0.600	0.874
ICPROC2	16.87	14.450	0.792	0.645	0.862
ICPROC3	16.91	13.833	0.776	0.625	0.868
ICPROC4	16.75	14.551	0.769	0.604	0.870

Table 14: Reliability of scale for Innovation Capabilities (IC) – Marketing Innovation

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ICM1	28.56	43.102	0.897	0.842	0.960
ICM2	28.56	43.188	0.913	0.879	0.958
ICM3	28.57	44.957	0.853	0.751	0.964
ICM4	28.52	43.911	0.930	0.895	0.956
ICM5	28.38	45.083	0.904	0.891	0.959
ICM6	28.26	46.310	0.863	0.811	0.963

Table 15: Reliability of scale for Innovation Capabilities (IC) – Organisational Innovation

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ICO1	23.16	24.299	0.895	0.860	0.944
ICO2	23.20	24.902	0.916	0.878	0.940
ICO3	23.35	25.445	0.846	0.724	0.952
ICO4	23.13	25.160	0.856	0.772	0.950
ICO5	23.18	25.785	0.885	0.807	0.946

Table 16: Reliability of scale for Innovation Capabilities (IC) overall

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ICPROD1	112.28	533.799	0.735	0.828	0.971
ICPROD2	112.35	535.106	0.728	0.841	0.971
ICPROD3	112.20	534.243	0.758	0.841	0.971
ICPROD4	112.26	536.580	0.778	0.837	0.970
ICPROD5	112.36	534.215	0.775	0.815	0.970
ICPROD6	112.39	541.923	0.647	0.636	0.972
ICPROC1	111.89	538.407	0.796	0.756	0.970
ICPROC2	112.15	539.717	0.766	0.728	0.971
ICPROC3	112.18	537.026	0.745	0.694	0.971
ICPROC4	112.03	539.126	0.768	0.681	0.971
ICM1	112.04	529.615	0.839	0.869	0.970
ICM2	112.05	532.357	0.815	0.892	0.970
ICM3	112.06	537.668	0.770	0.793	0.971

ICM4	112.01	534.316	0.832	0.904	0.970
ICM5	111.87	537.710	0.816	0.896	0.970
ICM6	111.74	538.800	0.829	0.851	0.970
ICO1	111.81	537.482	0.787	0.880	0.970
ICO2	111.85	538.934	0.819	0.895	0.970
ICO3	112.00	539.028	0.803	0.769	0.970
ICO4	111.79	540.342	0.769	0.811	0.971
ICO5	111.83	542.060	0.804	0.838	0.970

Table 17: Reliability of scale for Organisational Performance

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PERF1	20.75	37.359	0.785	0.622	0.925
PERF2	20.96	34.963	0.849	0.786	0.913
PERF3	20.90	34.579	0.838	0.784	0.916
PERF4	20.95	35.104	0.838	0.734	0.915
PERF5	20.94	35.645	0.808	0.695	0.921

Table 18: Pearson's correlation matrix

	Pearson's Correlations															
Construct	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1.Top Management Capabilities	1															
2.Technological Competence	.656**	1														
3.Technological Competence – Skill	.501**	.913**	1													
4.Technological Competence – Will	.616**	.900**	.747**	1												
5.Technological Competence – Knowledge	.659**	.843**	.619**	.672**	1											
6.Organisational Learning	-.041	-.013	-.034	-.034	.042	1										
7.Entrepreneurial Orientation	.709**	.639**	.490**	.560**	.679**	-.147*	1									
8.Entrepreneurial Orientation – Risk Taking	.557**	.547**	.409**	.477**	.598**	-.076	.853**	1								
9.Entrepreneurial Orientation – Proactiveness	.620**	.576**	.438**	.523**	.601**	-.174**	.915**	.679**	1							
10.Entrepreneurial Orientation – Innovativeness	.699**	.569**	.452**	.484**	.601**	-.138*	.881**	.590**	.740**	1						
11.Innovation Capabilities	.817**	.646**	.518**	.588**	.635**	-.163**	.771**	.600**	.706**	.733**	1					
12.Innovation Capabilities – Product	.712**	.625**	.504**	.581**	.599**	-.199**	.800**	.601**	.739**	.777**	.852**	1				
13.Innovation Capabilities – Process	.726**	.597**	.492**	.538**	.576**	-.087	.663**	.501**	.585**	.667**	.904**	.707**	1			
14.Innovation Capabilities – Marketing	.731**	.540**	.420**	.493**	.547**	-.128*	.606**	.483**	.558**	.564**	.902**	.627**	.778**	1		
15.Innovation Capabilities – Organisational	.716**	.515**	.415**	.457**	.515**	-.137*	.629**	.519**	.584**	.563**	.883**	.615**	.786**	.777**	1	
16.Organisational Performance	.614**	.479**	.376**	.415**	.504**	-.085	.651**	.538**	.604**	.582**	.694**	.674**	.571**	.576**	.610**	1

Table 19: Outer loadings from PLS SEM

	manifest variable	latent variable	Loading	95% lower	95% upper	Significant from CI	p-value from T-test
EOI1 <- Innovativeness	EOI1	Innovativeness	0,89	0,86	0,92	yes	<0.01
EOI1 <- Entrepreneurial Orientation	EOI1	Entrepreneurial Orientation	0,81	0,73	0,86	yes	<0.01
EOI2 <- Innovativeness	EOI2	Innovativeness	0,91	0,88	0,94	yes	<0.01
EOI2 <- Entrepreneurial Orientation	EOI2	Entrepreneurial Orientation	0,77	0,7	0,83	yes	<0.01
EOI3 <- Innovativeness	EOI3	Innovativeness	0,9	0,86	0,93	yes	<0.01
EOI3 <- Entrepreneurial Orientation	EOI3	Entrepreneurial Orientation	0,81	0,76	0,86	yes	<0.01
EOP1 <- Proactiveness	EOP1	Proactiveness	0,86	0,81	0,91	yes	<0.01
EOP1 <- Entrepreneurial Orientation	EOP1	Entrepreneurial Orientation	0,8	0,72	0,85	yes	<0.01
EOP2 <- Proactiveness	EOP2	Proactiveness	0,89	0,85	0,92	yes	<0.01
EOP2 <- Entrepreneurial Orientation	EOP2	Entrepreneurial Orientation	0,78	0,72	0,84	yes	<0.01
EOP3 <- Proactiveness	EOP3	Proactiveness	0,91	0,88	0,93	yes	<0.01
EOP3 <- Entrepreneurial Orientation	EOP3	Entrepreneurial Orientation	0,86	0,81	0,89	yes	<0.01
EORT1 <- Risk Taking	EORT1	Risk Taking	0,89	0,84	0,93	yes	<0.01
EORT1 <- Entrepreneurial Orientation	EORT1	Entrepreneurial Orientation	0,75	0,66	0,82	yes	<0.01
EORT2 <- Risk Taking	EORT2	Risk Taking	0,92	0,88	0,94	yes	<0.01
EORT2 <- Entrepreneurial Orientation	EORT2	Entrepreneurial Orientation	0,77	0,68	0,84	yes	<0.01
EORT3 <- Risk Taking	EORT3	Risk Taking	0,88	0,84	0,92	yes	<0.01
EORT3 <- Entrepreneurial Orientation	EORT3	Entrepreneurial Orientation	0,76	0,68	0,83	yes	<0.01
ICM1 <- Marketing	ICM1	Marketing	0,93	0,9	0,95	yes	<0.01
ICM1 <- Innovation Capabilities	ICM1	Innovation Capabilities	0,86	0,81	0,9	yes	<0.01
ICM2 <- Marketing	ICM2	Marketing	0,94	0,91	0,96	yes	<0.01

	manifest variable	latent variable	Loading	95% lower	95% upper	Significant from CI	p-value from T-test
ICM2 <- Innovation Capabilities	ICM2	Innovation Capabilities	0,84	0,78	0,88	yes	<0.01
ICM3 <- Marketing	ICM3	Marketing	0,89	0,84	0,93	yes	<0.01
ICM3 <- Innovation Capabilities	ICM3	Innovation Capabilities	0,8	0,71	0,86	yes	<0.01
ICM4 <- Marketing	ICM4	Marketing	0,95	0,93	0,97	yes	<0.01
ICM4 <- Innovation Capabilities	ICM4	Innovation Capabilities	0,86	0,8	0,9	yes	<0.01
ICM5 <- Marketing	ICM5	Marketing	0,94	0,9	0,96	yes	<0.01
ICM5 <- Innovation Capabilities	ICM5	Innovation Capabilities	0,84	0,77	0,89	yes	<0.01
ICM6 <- Marketing	ICM6	Marketing	0,91	0,86	0,94	yes	<0.01
ICM6 <- Innovation Capabilities	ICM6	Innovation Capabilities	0,85	0,79	0,9	yes	<0.01
ICO1 <- Organisation	ICO1	Organisation	0,93	0,9	0,96	yes	<0.01
ICO1 <- Innovation Capabilities	ICO1	Innovation Capabilities	0,82	0,75	0,87	yes	<0.01
ICO2 <- Organisation	ICO2	Organisation	0,95	0,92	0,97	yes	<0.01
ICO2 <- Innovation Capabilities	ICO2	Innovation Capabilities	0,85	0,77	0,9	yes	<0.01
ICO3 <- Organisation	ICO3	Organisation	0,9	0,85	0,93	yes	<0.01
ICO3 <- Innovation Capabilities	ICO3	Innovation Capabilities	0,83	0,74	0,88	yes	<0.01
ICO4 <- Organisation	ICO4	Organisation	0,91	0,85	0,94	yes	<0.01
ICO4 <- Innovation Capabilities	ICO4	Innovation Capabilities	0,8	0,7	0,87	yes	<0.01
ICO5 <- Organisation	ICO5	Organisation	0,93	0,88	0,96	yes	<0.01
ICO5 <- Innovation Capabilities	ICO5	Innovation Capabilities	0,83	0,75	0,89	yes	<0.01
ICPROC1 <- Process	ICPROC1	Process	0,87	0,81	0,91	yes	<0.01
ICPROC1 <- Innovation Capabilities	ICPROC1	Innovation Capabilities	0,82	0,74	0,88	yes	<0.01

	manifest variable	latent variable	Loading	95% lower	95% upper	Significant from CI	p-value from T-test
ICPROC2 <- Process	ICPROC2	Process	0,89	0,84	0,92	yes	<0.01
ICPROC2 <- Innovation Capabilities	ICPROC2	Innovation Capabilities	0,79	0,7	0,85	yes	<0.01
ICPROC3 <- Process	ICPROC3	Process	0,87	0,82	0,91	yes	<0.01
ICPROC3 <- Innovation Capabilities	ICPROC3	Innovation Capabilities	0,77	0,69	0,84	yes	<0.01
ICPROC4 <- Process	ICPROC4	Process	0,87	0,81	0,91	yes	<0.01
ICPROC4 <- Innovation Capabilities	ICPROC4	Innovation Capabilities	0,79	0,7	0,86	yes	<0.01
ICPROD1 <- Product	ICPROD1	Product	0,9	0,85	0,93	yes	<0.01
ICPROD1 <- Innovation Capabilities	ICPROD1	Innovation Capabilities	0,75	0,67	0,82	yes	<0.01
ICPROD2 <- Product	ICPROD2	Product	0,9	0,86	0,93	yes	<0.01
ICPROD2 <- Innovation Capabilities	ICPROD2	Innovation Capabilities	0,74	0,65	0,81	yes	<0.01
ICPROD3 <- Product	ICPROD3	Product	0,93	0,91	0,95	yes	<0.01
ICPROD3 <- Innovation Capabilities	ICPROD3	Innovation Capabilities	0,77	0,69	0,83	yes	<0.01
ICPROD4 <- Product	ICPROD4	Product	0,92	0,89	0,94	yes	<0.01
ICPROD4 <- Innovation Capabilities	ICPROD4	Innovation Capabilities	0,79	0,71	0,85	yes	<0.01
ICPROD5 <- Product	ICPROD5	Product	0,91	0,87	0,94	yes	<0.01
ICPROD5 <- Innovation Capabilities	ICPROD5	Innovation Capabilities	0,79	0,71	0,84	yes	<0.01
ICPROD6 <- Product	ICPROD6	Product	0,83	0,75	0,88	yes	<0.01
ICPROD6 <- Innovation Capabilities	ICPROD6	Innovation Capabilities	0,67	0,55	0,76	yes	<0.01
OL1 <- Organisational Learning	OL1	Organisational Learning	0,95	0,93	0,97	yes	<0.01
OL2 <- Organisational Learning	OL2	Organisational Learning	0,97	0,92	0,98	yes	<0.01
OL3 <- Organisational Learning	OL3	Organisational Learning	0,93	0,86	0,96	yes	<0.01

	manifest variable	latent variable	Loading	95% lower	95% upper	Significant from CI	p-value from T-test
OL4 <- Organisational Learning	OL4	Organisational Learning	0,9	0,77	0,94	yes	<0.01
PERF1 <- Organisational Performance	PERF1	Organisational Performance	0,87	0,8	0,91	yes	<0.01
PERF2 <- Organisational Performance	PERF2	Organisational Performance	0,91	0,86	0,94	yes	<0.01
PERF3 <- Organisational Performance	PERF3	Organisational Performance	0,9	0,86	0,93	yes	<0.01
PERF4 <- Organisational Performance	PERF4	Organisational Performance	0,9	0,85	0,93	yes	<0.01
PERF5 <- Organisational Performance	PERF5	Organisational Performance	0,88	0,82	0,92	yes	<0.01
TCK1 <- Knowledge	TCK1	Knowledge	0,91	0,86	0,93	yes	<0.01
TCK1 <- Technological Competency	TCK1	Technological Competency	0,77	0,67	0,84	yes	<0.01
TCK2 <- Knowledge	TCK2	Knowledge	0,91	0,85	0,94	yes	<0.01
TCK2 <- Technological Competency	TCK2	Technological Competency	0,72	0,6	0,81	yes	<0.01
TCK3 <- Knowledge	TCK3	Knowledge	0,87	0,82	0,9	yes	<0.01
TCK3 <- Technological Competency	TCK3	Technological Competency	0,77	0,69	0,83	yes	<0.01
TCS1 <- skills	TCS1	skills	0,89	0,83	0,92	yes	<0.01
TCS1 <- Technological Competency	TCS1	Technological Competency	0,78	0,68	0,85	yes	<0.01
TCS2 <- skills	TCS2	skills	0,92	0,88	0,94	yes	<0.01
TCS2 <- Technological Competency	TCS2	Technological Competency	0,84	0,77	0,88	yes	<0.01
TCS3 <- skills	TCS3	skills	0,9	0,85	0,93	yes	<0.01
TCS3 <- Technological Competency	TCS3	Technological Competency	0,85	0,79	0,89	yes	<0.01
TCS4 <- skills	TCS4	skills	0,88	0,83	0,92	yes	<0.01
TCS4 <- Technological Competency	TCS4	Technological Competency	0,79	0,71	0,85	yes	<0.01
TCW1 <- wills	TCW1	wills	0,91	0,86	0,93	yes	<0.01
TCW1 <- Technological Competency	TCW1	Technological Competency	0,8	0,73	0,86	yes	<0.01

	manifest variable	latent variable	Loading	95% lower	95% upper	Significant from CI	p-value from T-test
TCW2 <- wills	TCW2	wills	0,92	0,89	0,94	yes	<0.01
TCW2 <- Technological Competency	TCW2	Technological Competency	0,86	0,81	0,9	yes	<0.01
TCW3 <- wills	TCW3	wills	0,89	0,83	0,93	yes	<0.01
TCW3 <- Technological Competency	TCW3	Technological Competency	0,8	0,71	0,86	yes	<0.01
TMC1 <- Top Management Capabilities	TMC1	Top Management Capabilities	0,96	0,94	0,97	yes	<0.01
TMC2 <- Top Management Capabilities	TMC2	Top Management Capabilities	0,96	0,94	0,97	yes	<0.01
TMC3 <- Top Management Capabilities	TMC3	Top Management Capabilities	0,95	0,94	0,97	yes	<0.01
TMC4 <- Top Management Capabilities	TMC4	Top Management Capabilities	0,94	0,92	0,96	yes	<0.01

Table 20: Final validity composition

		Factor Loading	CR	Cronbach's Alpha
Organisational Learning			**0.955**	**0.954**
OL1	In the last year to 3 years, my organisation has acquired and shared a lot of new and relevant knowledge that has given us a competitive advantage.	.916		
OL2	In the last year to 3 years, members in my organisation have acquired some critical capacities and skills that have given my organisation a competitive advantage.	.971		
OL3	In the last year to 3 years, the organizational improvements have been influenced fundamentally by new knowledge entering the organization.	.908		
OL4	In the last three years, I would describe my organisation as an organisation that always takes the time out to learn new things.	.869		
Technological Competence			**0.904**	**0.936**
Technological Competence – Knowledge				**0.870**
TCK1	My organisation has the knowledge needed to attract and retain qualified technical staff.	.879		
TCK2	My organisation has the knowledge needed to dominate, generate or absorb basic technologies.	.851		
TCK3	My organisation has the knowledge needed to set up programs oriented towards research & development initiatives that help suppliers and customers.	.786		

Technological Competence – Will				**0.892**
TCW1	My organisation has the will to obtain information about the latest tech trends and technologies relevant to my industry.	.847		
TCW2	My organisation has the will to develop technologically advanced internal processes.	.903		
TCW3	My organisation has the will to use existing technologies in new ways to create products and services relevant to the market they're in.	.822		
Technological Competence – Skill				**0.919**
TCS1	My organisation has the skill required to operate technical systems internally.	.836		
TCS2	My organisation has the skill required to use different software applications needed to conduct business efficiently.	.903		
TCS3	My organisation has the skill required to use technical tools to communication efficiently.	.877		
TCS4	My organisation has the skill required to develop software applications using a variety of software programming languages.	.823		
Top Management Capabilities			**0.966**	**0.966**
TMC1	In general, the top management in my firm assigns technology project champions to help implement new technical projects.	.942		
TMC2	In general, the top management in my firm ensures adequate funding of technology research and development initiatives.	.946		
TMC3	In general, the top management in my firm restructures work processes to leverage technology opportunities in the organisation.	.939		
TMC4	The top management in my firm facilitates technology transfer throughout the organisation.	.918		
Entrepreneurial Orientation Overall			**0.908**	**0.925**
Entrepreneurial Orientation – Risk Taking				**0.879**
EORT1	In general, the managers in my organisation have a strong appetite for high-risk projects and opportunities (with chances of very high return).	.834		
EORT2	In general, the managers in my organisation believe that owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives.	.886		
EORT3	In general, when confronted with decision-making situations involving uncertainty, my firm typically adopts an aggressive posture to maximise the probability of exploiting potential opportunities.	.808		
Entrepreneurial Orientation – Proactiveness				**0.865**
EOP1	In general, my firm typically initiates actions and processes, which competitors then respond to and sometimes follow.	.774		

EOP2	In general, my firm is very often the first business to introduce new product/services, administrative techniques, and operating technologies to the market.	.798		
EOP3	In general, my firm has a strong tendency to introduce novel ideas or products into the market and sometimes into new markets.	.901		
Entrepreneurial Orientation – Innovativeness				**0.885**
EOI1	In general, the top managers of my firm favour a strong emphasis on research and development, technological leadership and small innovations constantly.	.837		
EOI2	In general, my firm launched several new lines of products or services in the past 5 years.	.844		
EOI3	In general, changes in products or services in my firm in the past 5 years have usually been quite dramatic and shocked the market positively.	.864		
Innovation Capabilities Overall			**0.928**	**0.972**
Innovation Capabilities – Process				**0.898**
ICPROC1	In general, my organisation is constantly reviewing and improving its business processes.	.841		
ICPROC2	In general, my organisation changes product development methods at a great speed in comparison with its competitors.	.837		
ICPROC3	In the last three years or so, my company has developed and implemented many new management styles and approaches.	.819		
ICPROC4	In general, when we cannot solve a problem using conventional methods, we improvise using new methods.	.821		
Innovation Capabilities – Product				**0.952**
ICPROD1	The quality of our new products and services is superior to that of our competitors.	.873		
ICPROD2	The product design of our products and services (in terms of functionality and features) is superior to that of our competitors.	.881		
ICPROD3	In general, my organisation has an advantage over its competitors in terms of the new products it offers.	.926		
ICPROD4	In general, changes to our new products and services could be described as major in terms of their improvements in comparison to other competitors in the space.	.909		
ICPROD5	In general, our new products and services incorporate a large body of technological knowledge that is superior to that of our competitors.	.890		
ICPROD6	In general, the applications of our new products and services are quite often different from the applications of our main competitors' products and services.	.777		
Innovation Capabilities – Marketing				**0.967**
ICM1	Our marketing team is constantly improving its campaigns and messaging to stay ahead of the market.	.912		

ICM2	Our marketing team tries to find new and exciting ways to build and improve relationships with our customers.	.922		
ICM3	Our marketing and sales techniques are always revised, and we are always trying to find new methods of promoting our products and services to our customers.	.865		
ICM4	Our marketing team not only conceptualises its marketing ideas, but it also implements new and innovative marketing initiatives.	.952		
ICM5	Our marketing team is constantly looking for new and creative ways to communicate and position the firm's products and services.	.929		
ICM6	Our marketing team is constantly looking for new and creative ways to improve the firm's relationship with its suppliers.	.891		
Innovation Capabilities – Organisational				**0.957**
ICO1	My organisation as a whole is constantly innovating and discovering new opportunities to exploit.	.935		
ICO2	My organisation as a whole is constantly developing and executing new behaviours and innovative ways of working.	.949		
ICO3	My organisation as a whole is constantly coming up with new products and/or services to launch.	.869		
ICO4	My organisation as a whole is constantly embracing new technologies.	.863		
ICO5	My organisation as a whole is constantly coming up with new and advanced administrative practices to develop, utilise and execute.	.900		
Organisational Performance			**0.934**	**0.934**
PERF1	My organisation's performance measured by user/customer growth has been superior to that of its main competitors.	.818		
PERF2	My organisation's performance measured by financial investment has been superior to that of its main competitors.	.893		
PERF3	My organisation's performance measured by revenue has been superior to that of its main competitors.	.886		
PERF4	My organisation's performance measured by customer market share has been superior to that of its main competitors.	.862		
PERF5	My organisation's performance measured by sales of its main products and services has been superior to that of its main competitors.	.836		

Table 21: Fornell-Larcker criterion

	CR	AVE	MSV	MaxR(H)	EO	IC	PERF	TC	TMC	OL
EO	0.908	0.769	0.701	0.929	**0.877**					
IC	0.928	0.764	0.740	0.937	,837	**0.874**				

PERF	0.934	0.739	0.518	0.937	,720	,720	**0.859**			
TC	0.904	0.760	0.518	0.917	,719	,706	,522	**0.872**		
TMC	0.966	0.877	0.740	0.967	,784	,860	,644	,720	**0.936**	
OL	0.955	0.840	0.028	0.967	-,166	-,151	-,107	-,029	-,046	**0.917**

Table 22: Heterotrait-Monotrait criterion

	Heterotrait-Monotrait ratio					
	from	to	Ratio	95% lower	95% upper	Discriminate
Innovation Capabilities – > Entrepreneurial Orientation	Innovation Capabilities	Entrepreneurial Orientation	0,81	0,71	0,89	yes
Innovativeness – > Entrepreneurial Orientation	Innovativeness	Entrepreneurial Orientation	0,73	0,61	0,83	yes
Innovativeness – > Innovation Capabilities	Innovativeness	Innovation Capabilities	0,78	0,69	0,87	yes
Knowledge – > Entrepreneurial Orientation	Knowledge	Entrepreneurial Orientation	0,75	0,64	0,84	yes
Knowledge – > Innovation Capabilities	Knowledge	Innovation Capabilities	0,68	0,55	0,79	yes
Knowledge – > Innovativeness	Knowledge	Innovativeness	0,68	0,53	0,79	yes
Marketing – > Entrepreneurial Orientation	Marketing	Entrepreneurial Orientation	0,64	0,49	0,77	yes
Marketing – > Innovation Capabilities	Marketing	Innovation Capabilities	0,93	0,89	0,96	yes
Marketing – > Innovativeness	Marketing	Innovativeness	0,61	0,45	0,73	yes
Marketing – > Knowledge	Marketing	Knowledge	0,59	0,42	0,71	yes
Organisation – > Entrepreneurial Orientation	Organisation	Entrepreneurial Orientation	0,67	0,52	0,8	yes
Organisation – > Innovation Capabilities	Organisation	Innovation Capabilities	0,92	0,88	0,95	yes
Organisation – > Innovativeness	Organisation	Innovativeness	0,61	0,47	0,73	yes
Organisation – > Knowledge	Organisation	Knowledge	0,56	0,39	0,69	yes
Organisation – > Marketing	Organisation	Marketing	0,81	0,7	0,88	yes
Organisational Learning – > Entrepreneurial Orientation	Organisational Learning	Entrepreneurial Orientation	0,15	0,08	0,25	yes
Organisational Learning – > Innovation Capabilities	Organisational Learning	Innovation Capabilities	0,17	0,09	0,26	yes
Organisational Learning – > Innovativeness	Organisational Learning	Innovativeness	0,15	0,07	0,26	yes
Organisational Learning – > Knowledge	Organisational Learning	Knowledge	0,05	0,02	0,08	yes
Organisational Learning – > Marketing	Organisational Learning	Marketing	0,13	0,06	0,23	yes
Organisational Learning – > Organisation	Organisational Learning	Organisation	0,14	0,07	0,23	yes
Organisational Performance – > Entrepreneurial Orientation	Organisational Performance	Entrepreneurial Orientation	0,7	0,58	0,8	yes
Organisational Performance – > Innovation Capabilities	Organisational Performance	Innovation Capabilities	0,73	0,61	0,83	yes
Organisational Performance – > Innovativeness	Organisational Performance	Innovativeness	0,64	0,5	0,75	yes
Organisational Performance – > Knowledge	Organisational Performance	Knowledge	0,56	0,4	0,66	yes

Organisational Performance – > Marketing	Organisational Performance	Marketing	0,6	0,44	0,73	yes
Organisational Performance – > Organisation	Organisational Performance	Organisation	0,65	0,5	0,77	yes
Organisational Performance – > Organisational Learning	Organisational Performance	Organisational Learning	0,1	0,06	0,17	yes
Proactiveness – > Entrepreneurial Orientation	Proactiveness	Entrepreneurial Orientation	0,84	0,69	0,92	yes
Proactiveness – > Innovation Capabilities	Proactiveness	Innovation Capabilities	0,76	0,63	0,86	yes
Proactiveness – > Innovativeness	Proactiveness	Innovativeness	0,85	0,71	0,94	yes
Proactiveness – > Knowledge	Proactiveness	Knowledge	0,69	0,55	0,79	yes
Proactiveness – > Marketing	Proactiveness	Marketing	0,61	0,44	0,74	yes
Proactiveness – > Organisation	Proactiveness	Organisation	0,64	0,49	0,77	yes
Proactiveness – > Organisational Learning	Proactiveness	Organisational Learning	0,19	0,08	0,3	yes
Proactiveness – > Organisational Performance	Proactiveness	Organisational Performance	0,67	0,51	0,79	yes
Process – > Entrepreneurial Orientation	Process	Entrepreneurial Orientation	0,73	0,6	0,86	yes
Process – > Innovation Capabilities	Process	Innovation Capabilities	0,97	0,92	1	yes
Process – > Innovativeness	Process	Innovativeness	0,75	0,63	0,86	yes
Process – > Knowledge	Process	Knowledge	0,65	0,51	0,77	yes
Process – > Marketing	Process	Marketing	0,84	0,69	0,92	yes
Process – > Organisation	Process	Organisation	0,85	0,73	0,92	yes
Process – > Organisational Learning	Process	Organisational Learning	0,09	0,05	0,17	yes
Process – > Organisational Performance	Process	Organisational Performance	0,62	0,46	0,76	yes
Process – > Proactiveness	Process	Proactiveness	0,66	0,51	0,8	yes
Product – > Entrepreneurial Orientation	Product	Entrepreneurial Orientation	0,85	0,76	0,91	yes
Product – > Innovation Capabilities	Product	Innovation Capabilities	0,88	0,82	0,92	yes
Product – > Innovativeness	Product	Innovativeness	0,85	0,78	0,91	yes
Product – > Knowledge	Product	Knowledge	0,65	0,51	0,75	yes
Product – > Marketing	Product	Marketing	0,65	0,51	0,76	yes
Product – > Organisation	Product	Organisation	0,65	0,5	0,76	yes
Product – > Organisational Learning	Product	Organisational Learning	0,21	0,09	0,31	yes
Product – > Organisational Performance	Product	Organisational Performance	0,71	0,6	0,81	yes
Product – > Proactiveness	Product	Proactiveness	0,81	0,68	0,91	yes

Product – > Process	Product	Process	0,77	0,65	0,86	yes
Risk Taking – > Entrepreneurial Orientation	Risk Taking	Entrepreneurial Orientation	0,95	0,9	0,99	yes
Risk Taking – > Innovation Capabilities	Risk Taking	Innovation Capabilities	0,65	0,5	0,77	yes
Risk Taking – > Innovativeness	Risk Taking	Innovativeness	0,67	0,5	0,8	yes
Risk Taking – > Knowledge	Risk Taking	Knowledge	0,68	0,55	0,79	yes
Risk Taking – > Marketing	Risk Taking	Marketing	0,52	0,36	0,68	yes
Risk Taking – > Organisation	Risk Taking	Organisation	0,57	0,39	0,72	yes
Risk Taking – > Organisational Learning	Risk Taking	Organisational Learning	0,08	0,03	0,18	yes
Risk Taking – > Organisational Performance	Risk Taking	Organisational Performance	0,59	0,44	0,72	yes
Risk Taking – > Proactiveness	Risk Taking	Proactiveness	0,78	0,66	0,87	yes
Risk Taking – > Process	Risk Taking	Process	0,56	0,38	0,71	yes
Risk Taking – > Product	Risk Taking	Product	0,66	0,5	0,78	yes
Technological Competency – > Entrepreneurial Orientation	Technological Competency	Entrepreneurial Orientation	0,69	0,57	0,78	yes
Technological Competency – > Innovation Capabilities	Technological Competency	Innovation Capabilities	0,67	0,55	0,78	yes
Technological Competency – > Innovativeness	Technological Competency	Innovativeness	0,63	0,47	0,75	yes
Technological Competency – > Knowledge	Technological Competency	Knowledge	0,93	0,86	0,98	yes
Technological Competency – > Marketing	Technological Competency	Marketing	0,57	0,42	0,69	yes
Technological Competency – > Organisation	Technological Competency	Organisation	0,54	0,38	0,68	yes
Technological Competency – > Organisational Learning	Technological Competency	Organisational Learning	0,05	0,04	0,06	yes
Technological Competency – > Organisational Performance	Technological Competency	Organisational Performance	0,51	0,36	0,63	yes
Technological Competency – > Proactiveness	Technological Competency	Proactiveness	0,64	0,5	0,75	yes
Technological Competency – > Process	Technological Competency	Process	0,65	0,53	0,77	yes
Technological Competency – > Product	Technological Competency	Product	0,66	0,51	0,76	yes
Technological Competency – > Risk Taking	Technological Competency	Risk Taking	0,6	0,46	0,73	yes
Top Management Capabilities – > Entrepreneurial Orientation	Top Management Capabilities	Entrepreneurial Orientation	0,75	0,64	0,81	yes
Top Management Capabilities – > Innovation Capabilities	Top Management Capabilities	Innovation Capabilities	0,84	0,8	0,87	yes
Top Management Capabilities – > Innovativeness	Top Management Capabilities	Innovativeness	0,76	0,65	0,83	yes
Top Management Capabilities – > Knowledge	Top Management Capabilities	Knowledge	0,72	0,61	0,8	yes
Top Management Capabilities – > Marketing	Top Management Capabilities	Marketing	0,76	0,69	0,81	yes

Top Management Capabilities – > Organisation	Top Management Capabilities	Organisation	0,74	0,67	0,8	yes
Top Management Capabilities – > Organisational Learning	Top Management Capabilities	Organisational Learning	0,05	0,02	0,08	yes
Top Management Capabilities – > Organisational Performance	Top Management Capabilities	Organisational Performance	0,65	0,54	0,75	yes
Top Management Capabilities – > Proactiveness	Top Management Capabilities	Proactiveness	0,68	0,55	0,78	yes
Top Management Capabilities – > Process	Top Management Capabilities	Process	0,78	0,7	0,84	yes
Top Management Capabilities – > Product	Top Management Capabilities	Product	0,74	0,66	0,82	yes
Top Management Capabilities – > Risk Taking	Top Management Capabilities	Risk Taking	0,61	0,47	0,72	yes
Top Management Capabilities – > Technological Competency	Top Management Capabilities	Technological Competency	0,69	0,57	0,78	yes
skills – > Entrepreneurial Orientation	skills	Entrepreneurial Orientation	0,53	0,38	0,67	yes
skills – > Innovation Capabilities	skills	Innovation Capabilities	0,55	0,42	0,67	yes
skills – > Innovativeness	skills	Innovativeness	0,5	0,34	0,65	yes
skills – > Knowledge	skills	Knowledge	0,69	0,56	0,81	yes
skills – > Marketing	skills	Marketing	0,44	0,29	0,59	yes
skills – > Organisation	skills	Organisation	0,44	0,29	0,59	yes
skills – > Organisational Learning	skills	Organisational Learning	0,05	0,02	0,07	yes
skills – > Organisational Performance	skills	Organisational Performance	0,41	0,25	0,56	yes
skills – > Proactiveness	skills	Proactiveness	0,49	0,33	0,64	yes
skills – > Process	skills	Process	0,54	0,41	0,67	yes
skills – > Product	skills	Product	0,54	0,39	0,67	yes
skills – > Risk Taking	skills	Risk Taking	0,46	0,29	0,62	yes
skills – > Technological Competency	skills	Technological Competency	0,74	0,66	0,82	yes
skills – > Top Management Capabilities	skills	Top Management Capabilities	0,53	0,4	0,65	yes
wills – > Entrepreneurial Orientation	wills	Entrepreneurial Orientation	0,62	0,47	0,73	yes
wills – > Innovation Capabilities	wills	Innovation Capabilities	0,63	0,49	0,74	yes
wills – > Innovativeness	wills	Innovativeness	0,55	0,37	0,69	yes
wills – > Knowledge	wills	Knowledge	0,76	0,61	0,87	yes
wills – > Marketing	wills	Marketing	0,53	0,37	0,67	yes
wills – > Organisation	wills	Organisation	0,49	0,33	0,65	yes
wills – > Organisational Learning	wills	Organisational Learning	0,05	0,03	0,06	yes

wills – > Organisational Performance	wills	Organisational Performance	0,45	0,3	0,59	yes
wills – > Proactiveness	wills	Proactiveness	0,59	0,44	0,72	yes
wills – > Process	wills	Process	0,6	0,45	0,73	yes
wills – > Product	wills	Product	0,63	0,47	0,76	yes
wills – > Risk Taking	wills	Risk Taking	0,54	0,36	0,7	yes
wills – > Technological Competency	wills	Technological Competency	0,76	0,65	0,83	yes
wills – > Top Management Capabilities	wills	Top Management Capabilities	0,66	0,54	0,76	yes
wills – > skills	wills	skills	0,82	0,72	0,89	yes

Table 23: Path coefficients

	from	to	Path coefficient	95% lower	95% upper	Significant from CI	p-value from T-test
Entrepreneurial Orientation – > Innovativeness	Entrepreneurial Orientation	Innovativeness	0,88	0,83	0,92	yes	<0.01
Entrepreneurial Orientation – > Organisational Performance	Entrepreneurial Orientation	Organisational Performance	0,31	0,04	0,53	yes	0,01
Entrepreneurial Orientation – > Proactiveness	Entrepreneurial Orientation	Proactiveness	0,92	0,88	0,94	yes	<0.01
Entrepreneurial Orientation – > Risk Taking	Entrepreneurial Orientation	Risk Taking	0,85	0,78	0,9	yes	<0.01
Innovation Capabilities – > Marketing	Innovation Capabilities	Marketing	0,91	0,87	0,94	yes	<0.01
Innovation Capabilities – > Organisation	Innovation Capabilities	Organisation	0,89	0,84	0,93	yes	<0.01
Innovation Capabilities – > Organisational Performance	Innovation Capabilities	Organisational Performance	0,45	0,24	0,7	yes	<0.01
Innovation Capabilities – > Process	Innovation Capabilities	Process	0,91	0,85	0,94	yes	<0.01
Innovation Capabilities – > Product	Innovation Capabilities	Product	0,84	0,77	0,89	yes	<0.01
Organisational Learning – > Entrepreneurial Orientation	Organisational Learning	Entrepreneurial Orientation	-0,12	-0,2	-0,04	yes	<0.01
Organisational Learning – > Innovation Capabilities	Organisational Learning	Innovation Capabilities	-0,13	-0,19	-0,07	yes	<0.01
Technological Competency – > Entrepreneurial Orientation	Technological Competency	Entrepreneurial Orientation	0,31	0,15	0,45	yes	<0.01
Technological Competency – > Innovation Capabilities	Technological Competency	Innovation Capabilities	0,19	0,07	0,32	yes	<0.01
Technological Competency – > Knowledge	Technological Competency	Knowledge	0,84	0,77	0,9	yes	<0.01
Technological Competency – > Skills	Technological Competency	skills	0,91	0,87	0,94	yes	<0.01
Technological Competency – > Wills	Technological Competency	wills	0,91	0,87	0,93	yes	<0.01
Top Management Capabilities – > Entrepreneurial Orientation	Top Management Capabilities	Entrepreneurial Orientation	0,5	0,36	0,63	yes	<0.01
Top Management Capabilities – > Innovation Capabilities	Top Management Capabilities	Innovation Capabilities	0,69	0,59	0,77	yes	<0.01

Table 24: FINAL SEM model – Regression weights

Hypotheses / Path Analysis			Estimates	Standardised Estimates	T-value	P-value	Hypothesis Supported
TCM	→	EO	,334	,543	6,812	***	Supported
TCM	→	IC	,478	,715	10,322	***	Supported
TC	→	EO	,309	,332	4,242	***	Supported
TC	→	IC	,194	,191	3,010	,003	Supported
OL	→	EO	-,080	-,131	-2,935	,003	Not Supported – Negative Relationship
OL	→	IC	-,072	-,109	-2,863	,004	Not Supported – Negative Relationship
EO	→	PERF	,511	,410	4,736	***	Supported
IC	→	PERF	,445	,388	4,723	***	Supported

*Note: *** Indicates that p-value < 0.001*

Table 25: SEM model – Regression weights (Worked for other Startups = Yes)

Hypotheses / Path Analysis			Estimates	Standardized Estimates	T-value	P-value	Hypothesis Supported
TCM	→	EO	,339	,591	6,116	***	Supported
TCM	→	IC	,497	,701	8,722	***	Supported
TC	→	EO	,307	,356	3,960	***	Supported
TC	→	IC	,235	,220	2,937	,003	Supported
OL	→	EO	-,104	-,181	-3,483	***	Not Supported – Negative Relationship
OL	→	IC	-,070	-,099	-2,197	,028	Not Supported – Negative Relationship
EO	→	PERF	,485	,417	2,993	,003	Supported
IC	→	PERF	,310	,330	2,528	,011	Supported

Table 26: SEM model – Regression weights (Worked for other Startups = No)

Hypotheses / Path Analysis			Estimates	Standardized Estimates	T-value	P-value	Hypothesis Supported
TCM	→	EO	,351	,547	4,129	***	Supported
TCM	→	IC	,512	,846	6,458	***	Supported
TC	→	EO	,218	,205	1,622	,105	Supported
TC	→	IC	-,011	-,011	-,105	,916	Supported
OL	→	EO	-,022	-,036	-,468	,640	Not Supported – Negative Relationship
OL	→	IC	-,074	-,129	-1,889	,059	Not Supported – Negative Relationship
EO	→	PERF	,752	,498	4,732	***	Supported
IC	→	PERF	,619	,387	3,937	***	Supported

Table 27: SEM model – Regression weights (Founder educated overseas = Yes)

Hypotheses / Path Analysis			Estimates	Standardized Estimates	T-value	P-value	Hypothesis Supported
TCM	→	EO	,412	,554	5,080	***	Supported
TCM	→	IC	,409	,794	6,656	***	Supported
TC	→	EO	,261	,248	2,372	,018	Supported
TC	→	IC	,003	,004	,046	,963	Supported but insignificant
OL	→	EO	-,062	-,099	-1,434	,152	Not Supported – Negative Relationship
OL	→	IC	-,045	-,104	-1,555	,120	Not Supported – Negative Relationship
EO	→	PERF	,717	,599	5,059	***	Supported
IC	→	PERF	,272	,157	1,538	,124	Supported but insignificant

Table 28: SEM model – Regression weights (Founder educated overseas = No)

Hypotheses / Path Analysis			Estimates	Standardized Estimates	T-value	P-value	Hypothesis Supported
TCM	→	EO	,344	,573	4,845	***	Supported
TCM	→	IC	,556	,687	7,015	***	Supported
TC	→	EO	,381	,425	3,672	***	Supported
TC	→	IC	,355	,294	3,337	***	Supported

OL	→	EO	-,071	-,102	-1,854	,064	Not Supported – Negative Relationship
OL	→	IC	-,156	-,166	-3,561	***	Not Supported – Negative Relationship
EO	→	PERF	,624	,598	4,023	***	Supported
IC	→	PERF	1,721	1,705	6,441	***	Supported