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Technological upgrading and secondary innovation in the South African IT Industry

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Technological upgrading and secondary innovation in the South African IT Industry

Thabitha Motau

This research report is submitted to the graduate school of University of Witwatersrand, Wits Business School as part of the requirements to fulfil the degree of Master of Management in the field of Innovation Studies

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Abstract

Information technology (IT) plays a critical role in solving complex business tasks and enabling businesses to provide solutions and services to customers. Most businesses and governments are efficient because of technology. Because of technology, people can connect and communicate around the globe faster than they could during the days of letters. IT can enable a country, businesses, and society to adapt to changes around them. For a country that is afflicted by many challenges such as poverty, unemployment, and health care challenges, IT can resolve these challenges using technology in a way that will have a positive impact on the South African economy. Due to globalisation, South Africa now forms part of the global economy and relies on IT to participate and compete in this global market. For several years, South Africa has been ranked as the most technologically advanced and innovative country in Sub-Saharan African region by The Global Competitiveness Report (GCR).

The purpose of this report is to explore how South African IT companies have used imported technology to achieved higher levels of technological capabilities enabling the companies to develop endogenous innovation and sustainable economic growth which has resulted in the high ratings by the GCR. Empirical research was conducted focusing on two South African IT companies. The study was conducted using semi-structured interviews consisting of managing directors and chief executive officers of these two companies focusing on market entry strategy, value proposition, business model innovation (BMI) and technological paradigms and future growth plans. An industry expert was also interviewed as the third source of data collection to achieve triangulation.

The key findings of the study based on the data collected from the two companies and the industry expert, are that the South African IT companies have achieved technological upgrading that has produced endogenous innovation specific to certain industries with a focus on business model innovation. South African IT companies have strategically employed BMI as a valuable tool, allowing SMEs to navigate the trade-off

between innovation costs and benefits. BMI involves the creation, delivery, and capture of new value by designing innovative products or services tailored to meet unmet local customer needs. This may include process innovation for enhanced efficiency, optimising product distribution, integrating new technologies, reconfiguring existing activities, providing managed services for day-to-day support, and exploring new partnerships.

The emergence of new technologies has presented opportunities for novel partnerships and the redefinition of existing process and business model architectures. This adaptive approach is crucial for maintaining competitiveness in the market. Furthermore, the integration of emerging technologies serves as an avenue for capturing new customers and fostering the growth of new IT start-ups.

This report presents a detailed account of strategies followed by the two case studies to build technological capabilities to produce endogenous innovation.

Declaration

I, Thabitha Motau, declare that this thesis is my independent work. It forms part of the completion of the degree of Master of Management in the field of Innovation Studies at the graduate school of the University of Witwatersrand, Wits business school. It is the first time this thesis is submitted for any degree or examination at this or any other University.

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…… day of ……2023

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Dedication

To my beautiful daughter Nia Motau

Acknowledgements

I would first like to thank my daughter for her patience, and resilience throughout the study period. I have seen the frustrations and pain in her eyes every time I could not spend time with her, and that encouraged me to focus and complete my studies knowing that it will benefit both of us. I promised to spend more time with her post-completion. A special thank you like to thank my family, especially my mother Rebecca Motau, and brothers Modishe and Ditshepu Motau for their love, support and for stepping in when I could not be there for my daughter.

I extend my sincere gratitude to my friends Beryl Diezun, Ndumi Hadebe, Felicia Letsie, and Dibuseng Mokoena who were there on the side-lines supporting me and encouraging me to focus and see this project through, it is their support and encouragement that carried me through this journey.

A big thank you to the case study companies, their participants, and the industry expert who willingly shared their knowledge and were always available to answer further questions about this research project. And lastly thank you to my supervisor Professor Mjumo Mzyece for his guidance.

Any omission to this brief acknowledgment is not by any means due to a lack of gratitude.

Table of Contents

Abstract i

Declaration iii

Dedication iv

Acknowledgements v

List of Figures x

List of Table xi

List of abbreviations xii

Chapter 1: Introduction 1

1.1 Introduction 1

1.2 The purpose of the study 3

1.3 Problem statement 5

1.4 Significance of the study 7

1.5 Limitations of the Study 7

1.6 Assumptions 7

1.7 Research questions 8

1.8 Definitions of key Words 8

1.9 Report Structure 9

Chapter 2: Literature review 11

2.1 Introduction 11

2.2 Secondary innovation 12

2.2.1 Secondary innovation framework 13

2.3 Technological capability building and secondary innovation. 18

2.3.1 Duplicative Imitation 20

2.3.2 Creative imitation 21

2.3.3 Exploitative innovation 22

2.3.4 Explorative innovation 22

2.3.5 Factors that promote technological upgrading 23

2.3.5.1 Market Conditions 23
2.3.5.2 Technology Flow 24
2.3.5.3 Time 25
2.4 Secondary Business model innovation 26
2.4.1 Three BM dimensions of BMI 29
2.5 Comparison between China and South Africa 32
2.6 The role of government in enabling technology upgrading for companies in LDC 34
2.7 Secondary Innovation in the IT industry 36
2.8 Summary 40
2.9 Conceptual Framework 41
Chapter 3: Research Methodology and Design 44
3.1 Introduction 44
3.2 Research Strategy and design 44
3.2.1 Sampling Strategy 45
3.2.2 Data Collection instruments 46
3.2.2.1 Participants selection process 47
3.2.3 Interview process 47
3.2.4 Secondary data sources 48
3.3 Data Analysis 49
3.4 Ethical Considerations 50
3.5 Reliability and Validity 50
Chapter 4: Presentation of data 52
4.1 Introduction 52
4.2 Profile of Participants 52
4.2.1 Brief introduction of Company 1 53
4.2.1.1 Participants from Company 1 54
4.2.2 Brief introductory of Company 2 54

4.2.2.1 Participants from Company 2 54
4.2.3 Brief introduction of the industry expert 55
4.2.3.1 The IT industry expert 55
4.3 Presentation of results 55
4.3.1 Market entry strategy 56
4.3.2 Value proposition 59
4.3.3 Organisational learning and Technological capability building 64
4.3.4 Business model innovation 68
4.3.5 Solution Commercialisation 68
4.3.6 Network Partner Ecosystem 71
4.3.7 Digital technologies and future growth opportunities 74
4.4 Summary 77
Chapter 5: Analysis of data 82
5.1 Introduction 82
5.2 Market Entry Strategy 82
5.3 Value proposition 84
5.3.1 Identifying Market needs and challenges. 85
5.3.2 Organisational learning and technological capability building 88
5.3.3 Business Model Innovation 90
5.3.4 Solution Commercialisation 90
5.3.5 Network partner ecosystem 92
5.3.6 Digital technologies and future growth opportunities 95
5.4 Summary 98
5.4.1 Succinct answers to the research questions 101
Chapter 6: Recommendations and conclusion 103

6.1 Introduction 103
6.2 Research Questions 103
6.3 Key Conclusion of the study 104
6.4 Major findings 105
6.4.1 Recommendations 110
6.4.1.1 Recommendations for company 1 110
6.4.1.2 Recommendations for Company 2 111
6.5 Limitations of the study 112
6.6 Possible areas of future study. 113
References 114
Appendix A: Introduction to research project 128
Appendix B Consent Form 131
Appendix C: Research Instruments – Case companies 134

List of Figures

Figure 1: Dynamic secondary innovation model process. Sourced from Wu & Li,(2015). 16
Figure 2: The capability building process in latecomer companies. Source from (Wu et al., 2006) 20
Figure 3: Business model dimensions 29
Figure 4: Conceptual framework for producing endogenous secondary innovation and achieving sustainable economic growth. 42

List of Table

Table 1: Comparison between China and South Africa. Data Sourced from (Country economy, 2023) 32
Table 2: Validity and reliability of the study 50
Table 3: Company comparison 52
Table 4: Profile of participants from Company 1 54
Table 5: Profile of participants from Company 2 54
Table 6: Profile of the industry expert 55
Table 7: Summary of Market entry strategy responses 58
Table 8: Summary of value proposition responses 61
Table 9: Summary of capability and skills development responses 66
Table 10: Summary responses for BMI - solution Commercialisation 70
Table 11: Summary of responses for BMI-Partner ecosystem 73
Table 12: Future growth opportunities and digital technologies 76
Table 13: Summary of findings 101

List of abbreviations

4IR - Fourth industrial revolution

BMI - Business Model Innovation

MNC - Multinational Corporation

IT - Information Technology

IP - Intellectual Property

ICT - Information technology and communication

LDC - Less developed countries

BEE - Black economic empowerment

OEM - Original Equipment Manufacturer

VAR - Value-added reseller

ICT - Information Technology and Communication

R&D - Research & Development

NIE - Newly industrialised economies

SME - Small medium enterprises

SA - South Africa

Chapter 1: Introduction

1.1 Introduction

IT as an industry has evolved from a mere installation of software and hardware that support business processes with selected people that can access IT. The evolution has led to IT companies enabling digitisation solving complex business activities, enabling communication and collaboration with businesses. The evolution is attributed to the consistent innovation that has made impact in the industry from physical Infrastructure to cloud computing. IT has now become a critical function within organisations that enables the business to perform better and respond to requests and changes faster. This evolution has led to more complex and sophisticated IT environments that run big complex businesses. Business is faced with the need to produce quality products and services that are reliable, stable, quicker, and faster to compete in the market and rely on IT to enable the achievement of a competitive advantage in a global business environment.

Globalisation has seen South Africa compete in the global market and this has meant that multinationals can operate in South Africa and offer IT services and products to South Africa. According to Maumbe & Okello (2010) the diffusion of information and communication technology (ICT) has led to integration between ordinary citizens, businesses, and governments globally. This has resulted in knowledge and information societies. Maumbe & Okello (2010) argue that although ICT has been led and driven by developed countries, we are now seeing a massive growth and adoption of IT services and products in developing countries.

The demand for IT products and services has seen an influx of multinational corporations (MNCs) into South Africa as well as an emergence of domestic companies specialising in IT. For the MNCs to succeed, they must take into consideration the local content, policies and regulations for the adoption and diffusion of the foreign technology in emerging economies such as South Africa (Hebert & Benbasat, 1994). On the other

hand, Wu et al. (2010) argue that majority of these MNCs import their foreign technology which worked in their home countries and expect it to work in developing countries without any customisation.

The survival of multinationals depends on an adaption of a BMI that will take into consideration the local conditions and meet the legitimacy of doing business in South Africa (Wu et al., 2019). The pressure for the MNC to successfully operate in the South African market and meet the local regulations such as black economic empowerment (BEE) policies has led to the emergence of domestic IT companies that understand the market conditions and already have the regulation legitimacy (Wu et al., 2013, 2019). These domestic IT firms are unfortunately plagued with lack of funds and skills, and the challenges that South Africa faces as a country such as inequality, poverty, and high unemployment rate. Muchie (2004) mentioned that the previous regime's policies have created two economies in South Africa. One economy is dominated by the elite minorities while the other represents most of the population from underprivileged backgrounds who meet the requirements of the BEE policy. BEE was put in place by government to redress the inequality in South Africa. Muchie (2004) further argues that most African countries were left in a dire state by the previous regime with a weaker national innovation system to coordinate innovation activities.

Due to a lack of resources, the latecomer companies had to partner with the MNCs to enter the market as resellers of the MNCs' technology under Original Equipment Manufacturer (OEM) reseller partner programs. This reseller partnership allows the latecomer IT companies to sell and distribute a set amount of the foreign technology in the form of software or physical hardware or cloud technology at an agreed price. The reseller can sell these technologies at a cost-plus margin price using the OEM's trademark and logo (Milstein, 2004) . The OEM gives the reseller rebates for the quantity of units sold and that is how the latecomers enter the market and generate income to survive and sustain themselves. With the added understanding of the domestic customer challenges, the latecomer companies use their expertise gained

from reselling the products and add some services called value added reseller (VAR) services to meet these domestic requirements and increase customer satisfaction.

According to an ICT Talent Whitepaper - South Africa - Huawei Enterprise (2022)there is an emergence of niche ICT firms due to the economic digital drive, while research performed by research markets in 2022 reports that the majority of IT companies in South Africa are small companies that employ less than 50 people.

Latecomer companies in other low to middle income countries have leveraged the secondary innovation framework combined with their knowledge of the domestic market to gain economic catch-up. According to Wu & Zhang (2010) the Asian tigers such as Japan, Taiwan and Singapore have achieved economic catch-up at a macro level by employing the secondary innovation framework. Even China with different economic market conditions, such as a large population with different affordability levels, has used the secondary innovation framework to learn and advance economically (Wu, Ma, Shi, et al., 2009).

China's market conditions are like those in South Africa. As such the secondary innovation framework can be applied by latecomer IT companies in South Africa to enter the market and achieve economic catch-up by producing endogenous innovation. There is however very limited literature about South African companies in the IT industry that have grown and achieved sustained economic growth using secondary innovation or those that have failed in the process.

1.2 The purpose of the study

This paper explores the technological learning and capability building that South African IT companies have followed beyond MNC partnership to produce secondary innovation that solves local customer problems. According to research and market report conducted in 2022 about the IT industry in south Africa, it states that "ratings of South Africa's IT industry compared to top global performers on network readiness to optimise the use of ICTs, the relationship between ICT infrastructure investment and economic

growth and digital competitiveness show that South Africa's rankings are low compared to global economies and the highest on the African continent" (Markets ltd, 2022). Mobile banking is highlighted as one of the innovative ICT services that have empowered South African customers to engage in banking activities virtually at their convenience, irrespective of time or location (Bankole & Bankole, 2017). The study seeks to investigate the market entry strategy by South African IT companies, the deliberate learning and skills devolvement process as well as innovation produced to meet the local market demands.

IT companies play a crucial role in providing technology that allows businesses to become competitive in the market. It is therefore imperative for IT companies to fully understand their customers' business, strategy, and market conditions they operate in, to enable their aspirations. According to Freeman (2007) by competing with new and improved products and services companies are likely to succeed in achieving economic growth and challenge the leaders in the market. The latecomer IT companies in South Africa can certainly use innovation for their own advancement as well as that of their customers. By learning from already existing and mature technology, latecomer companies can use the knowledge gained from technology acquired through the OEM partnerships, combine it with the intimate knowledge of their customers to develop innovation that will drive economic growth at a micro, meso and macro level (Arocena & Sutz, 2020; Santarius, 2016).

This study investigates how local South African IT companies have built indigenous technological capabilities using knowledge and skills obtained from localising mature technology as well as taking advantage of the technological paradigms such as 4IR technologies like machine learning (ML), artificial intelligence (AL) and digital human (Mhlanga, 2022; Schwab, 2017) to advance economically by combining the technological capabilities with domestic market demands. Gartner (2022a) points out that these are some of the digital technologies that have the potential to change the businesses and societal lives in this era by being disruptive. Nyagadza et al. (2022) believe that 4IR digital technologies will introduce growth opportunities for emerging

markets. Kaplinsky & Kraemer-Mbula (2022) point out that digital technologies are the catalyst behind the inclusion and growth of financial technology (Fintech) which has created new opportunities and adjacent service markets enabled by fintech.

Mhlanga (2022) agrees and confirms that AI has enabled digital financial inclusion which promotes the economic inclusion of youth, women, and people in rural areas as a result of added benefits such as reduced transaction costs compared to traditional financial services. Kaplinsky & Kraemer-Mbula (2022) believe that AI technologies are central to the achievement of sustainable development goals, which is aligned to Mhlanga (2022) who points out that AI provides a foundation of hunger and poverty alleviation. The author notes that there are AI initiatives in agriculture to identify crop diseases as well as predict crop yields to improve farming and food production (Mhlanga, 2022).

1.3 Problem statement

Scholars such as Schumpeter (1934) and Freeman (1995) stated that innovation plays a critical role in solution development to address social economic challenges while achieving economic growth for companies as well as the country at large. Kim (1980, 1997) and Wu et al. (2010, 2013; 2009) emphasised the critical role that secondary innovation and technological capabilities play in industrialising countries in addressing domestic market demands while solving societal challenges as well as achieving sustainable economic growth which leads to catching up with the pioneers from developed countries. There are significant studies done in other industrialising countries that have similar characteristics to South Africa such as China, Korea and Japan which have achieved industrialisation using secondary innovation (Kim, 1980, 1997; Xu et al., 2015)There are current studies on ICT innovation in South Africa, with a strong focus on mobile banking and advancements in internet technology. Mobility emerges as a key critical market and technology trend, significantly influencing information and communication technology. This trend is driven by the increased availability and access to the internet and mobile devices (Blanco et al., 2022; Knoesen & Seymour, 2019). In the white paper South Africa ICT-Centric Innovation Ecosystem Snapshot Version 1.1

for Comment (2018)the author advice that South Africa has recognised the imperative for a more robust promotion of digital technologies in business, highlighting the importance of ICT for inclusive economic growth. It is however encountering considerable challenges in harnessing new technological solutions due to the dominance of value chains by certain large enterprises which has adversely affected new entrants and entrepreneurs. Additionally, there is a lack of incentives for the private sector to invest in skills and training, with current training activities being perceived more as compliance requirements. Several challenges persist without resolution, including insufficient support and commercialisation of innovations, high costs with limited access.

To address these challenges, the department has outlined innovative approaches that require focused consideration. This includes encouraging stakeholders to adopt an ecosystem and platform approach, facilitating South Africa's navigation of the fourth industrial revolution (4IR). A crucial project in this regard is the establishment of an innovation centre aimed at expediting digital transformation for 4IR. This initiative is set to involve collaboration with various stakeholders and members of the Fourth Industrial Revolution Commission (*South Africa ICT-Centric Innovation Ecosystem Snapshot Version 1.1 for Comment*, 2018).

However, limited or no studies have been conducted in South Africa that explicitly examine the progress of local IT companies beyond their multinational partnerships, which initially facilitated market entry. There is a gap in understanding how these companies have attained sustainable economic growth, whether through the acquisition of knowledge and skills acquired from the multinational’s technology or, conversely, the challenges they face due to the absence of such advancements.

This study aims to examine the advancement of technological capabilities, the development of endogenous innovation, and the attainment of sustainable economic growth by local IT companies. It also seeks to understand how South African IT firms innovate their business models to capitalise on digital technologies. Additionally, the

study explores how these companies leverage network partner ecosystems to create solutions tailored to meet the specific needs of the local customer base.

1.4 Significance of the study

The study is significant as it will reveal the market entry strategy used by South African IT companies and how they have managed to achieve sustainable economic growth. The findings provide guidance to emerging IT companies on how to use foreign technology to build knowledge and develop indigenous technological capabilities and produce endogenous innovation that address socioeconomic challenges in South Africa, and the pitfalls to avoid that might lead to the extinction of the companies. It will also add to the body of knowledge by filling the gins on research around secondary innovation in the South African IT industry.

1.5 Limitations of the Study

This study is only based on two IT companies in Gauteng, South Africa. The two companies are different in size: Company 1 employs about 5 000 employees while Company 2 employs about 13 employees in a country that has about 20 000 IT companies (Mzekandaba, 2022). According to Markets ltd (2022), there are about 1336 IT companies with head office in South Africa (Crunchbase, 2019). Therefore, due to the small sample size, the findings might not be representative of the overall IT industry.

1.6 Assumptions

It is assumed that:

- The research instruments will be able to elicit reliable data to inform and answer the research questions.
- The participants will be honest and provide clear and detailed information.
- The respondents and the case study companies will be kept anonymous to protect any commercially sensitive information obtained as part of the study.

- The respondents will make themselves available for the interview.
- The outcome of the study is informed by the data collected from the interview process.
- The respondents selected by the company representative are knowledgeable and will provide their in-depth knowledge and experienced gained on the topic.

1.7 Research questions

This research report will answer the three research questions below:

- What have South African IT companies learned from the foreign technology acquired from MNCs to develop secondary innovation that meets local customer demands?
- How do local IT companies take advantage of digital technologies to develop and gain market entry using disruptive innovation?
- How might local IT companies reach original innovation in the South African IT industry and become more globally competitive?

1.8 Definitions of key Words

Innovation is a process of introducing a new or revised product or process with better quality than the previous one and presented to the market or the organisation to consume (Echevarría, 2008; Goffin & Mitchell, 2016; Oslo Manual, 2005) .

Secondary innovation is “the process whereby a latecomer firm from an industrialising country acquires technological innovation from an industrialised country, and then absorbs the innovation by understanding how the technology is constructed and functions” (Wu, Ma, & Xu, 2009; Wu, Ma, Shi, et al., 2009; Xu & Wu, 1992)”.

Technological paradigms are defined as the “pattern of solutions to selected technological problems, based on selected principles derived from natural sciences and on selected material technologies” (Dosi, 1982).

Technological capability is defined as the “great variety of knowledge and skills which firms need so that they acquire, assimilate, use, adapt, change, and create technology” (Ernst et al., 1998).

Endogenous innovation refers to innovation developed by either a company or a country due to internal capabilities, processes, and resources of that company or country, which is not influenced by external factors (Grossman & Helpman, 1994; Li et al., 2011).

Epistemology is “the theory of knowledge, the philosophical study of the nature, origin, and scope of knowledge (Moser, 2009; Rescher & Nicholas, 2002; Sławecki, 2018). The theory intends to clarify the origin of knowledge, how it is used and, and clarify the features it contains (Rescher & Nicholas, 2002).

1.9 Report Structure

Chapter 1: Introduction

This chapter introduces the study, including the background and reason for this study, while introducing the research questions, problem statement and how the study adds value to the body of literature.

Chapter 2: Literature Review

The chapter focuses on establishing an understanding of existing literature that relates to the study, highlight any gaps that exist in the current literature and assists with contextualising the findings of the study.

Chapter 3: Research Methodology and Design

The chapter highlights the research methodology applied to understand how the South African IT companies achieved technological upgrading.

Chapter 4: Presentation of Data

This chapter presents the data collected during the interview process with the two companies' representatives as well as the industry expert who was interviewed as part of the study.

Chapter 5: Analysis of results

The chapter presents in detail the findings of the interviews, linking the findings to the literature and then synthesising them with the author's insights.

Chapter 6: Recommendations and conclusion

This section presents the research findings and answers to the key research questions, as well as making recommendations for companies aligned to the purpose of the study on how the South African IT companies can achieve technological upgrading.

Chapter 2: Literature review

2.1 Introduction

This chapter is focused on a literature review of the secondary innovation theory and framework applied by emerging countries with complex and challenging backgrounds such as China to achieve economic catch-up. The frameworks will help us understand how IT Small and Medium Enterprises (SMEs) can advance beyond the level of OEM reseller or VAR, by using the knowledge of the domestic market and internal capabilities to produce endogenous innovation that addresses local challenges and achieves catch-up. These latecomer companies can employ the secondary innovation theoretical framework to produce endogenous innovation. According to Li et al. (2011), companies can use internal knowledge and assets accumulated from imported technology combined with the local market to achieve endogenous innovation that is relevant and new to their market backed by R&D. According to Andergassen & Nardini (2004) companies whose R&D divisions focuses on local information searching are more successful than those that focus on external information searches. Wu, Ma, & Xu (2009) consider that secondary innovation can be used as a catalyst for latecomer firms to move from duplicative imitation to endogenous technology innovation that is affordable to the local market.

The literature review focuses on the evolution of the secondary innovation framework, and the process of building technological capabilities followed by latecomer companies, as well as the secondary business model innovation that enables technological upgrading. The review is followed by a conceptual framework which was used to carry out the study.

The key themes that emerged from the literature and very much align with the study are as follows:

1. **Market entry strategy**

2. **Business model innovation**

3. **Solution commercialisation**

4. **Partner network ecosystem**

5. **Digital technologies and future growth opportunities**

2.2 Secondary innovation

“Secondary innovation is a sequential process containing technology acquisition, assimilation, improvement, and the crisis stage as a firm’s proactive response to technology acquired from foreign firms (Wu & Li, 2015).”

It has been proven by existing studies that developed countries have achieved economic growth and industrialisation through technological innovation. However, less developed countries used technology from the developed countries to achieve industrialisation. According to Xu & Wu (1992) innovation referred to as original innovation comes from developed countries which results in technological paradigms that eventually dominate and form technological change, while newly industrialising countries (NICs) such as Japan, have achieved industrialisation through the importation of mature technology from developed countries rendering it secondary innovation.

In the seminal work by Kim (1980) the author laid the foundation for secondary innovation by confirming that Korea achieved industrialisation through importation of packaged technologies from pioneering countries and build internal capabilities by following a linear process which consisted of three developmental stages namely: Implementation, Assimilation, and Improvement of technology acquired from developed countries. The process followed had resulted in the emergence of the electronics industry in Korea. Kim (1980) further confirms that the same model was followed by Japan in post-World War II to achieve industrialisation and the emergence of the Japanese spinning machine industry because of the expansion of the textile industry. In the seminal work by Kim (1980) confirmed that Korea had achieved industrialisation by importing packaged technologies from pioneering countries and building internal

capabilities following a linear process consisting of three developmental stages, namely: implementation, assimilation, and improvement of technology acquired from developed countries. This resulted in the emergence of the electronics industry in Korea. Kim (1980) further confirmed that the same model had been followed by Japan in the post-World War II era to achieve industrialisation, which led to the emergence of the Japanese spinning machine industry due to the expansion of the textile industry. Kim's (1980) work stands out as a pioneering article in the field of secondary innovation, shedding light on the strategic adoption of technologies by these countries during crucial developmental phases.

Secondary innovation was first introduced by Wu in the 1990's and was defined as a process of acquiring technological innovation from developed countries by companies in less developed countries and improving the imported technology during the technological paradigms shift (Q. Xu & Wu, 1992). However, following further research and studies of the concept Wu, Ma, & Xu (2009) argue that secondary innovation is more than just the process of assimilating and imitating the imported technology, it entails a detailed evolution process. Wu & Li (2015) define it as a process of acquiring technology from developed countries by latecomer companies from less developed countries, then absorbing and assimilating the acquired technology as part of capability building.

2.2.1 Secondary innovation framework

"Secondary innovation framework describes the dynamics of those with relatively poor resources and capabilities in their efforts to capture the values of mature/emerging technology or business models by acquiring them from across borders and then adapting to catching-up contexts Wu & Li (2015)*."*

The secondary innovation framework was first conceptualised by Xu & Wu (1992), it was further improved by (Wu et al., 2010; Wu, Ma, & Xu, 2009; Wu, Ma, Shi, et al., 2009; Wu & Zhang, 2010) following a series of empirical studies conducted on the engineering and manufacturing progress by Chinese companies. According to Kim (1980, 1997) Korean companies used a three phased linear process of technological

capability building to achieve industrialisation. However, Wu, Ma, Shi, et al (2009) argue that latecomer companies do not necessarily have to follow the three sequential phases to learn and achieve industrialisation, they can skip some phases and leapfrog to the front by rather integrating the technology and knowledge obtained. It is clearly articulated by the authors (Wu & Li, 2015) that the secondary innovation model was empirically used by latecomer companies from western countries to achieve catch-up, and later by the Newly industrialised economies (NIEs) from East Asian countries such as Taiwan, Hong Kong, Singapore, and Korea, referred to as Asian Tigers, to achieve their newly sustained economic status and catching up with the pioneers. However, Wu & Li (2015) further argue that the secondary innovation framework used by Chinese firms to build capability was different to that applied by Asian tigers following the study. The emerging secondary innovation framework takes into consideration China's unique characteristics of economic, social, and environmental conditions combined with customer requirements (Wu et al., 2006; Wu, Ma, & Xu, 2009; Wu, Ma, Shi, et al., 2009; Wu & Li, 2015) secondary innovation model distinguishes between the inherent factors of the traditional three phased capability development model of acquisition, assimilation, and improvement and emphasises the constant innovation that happens in every step of the process, as opposed to producing innovation from R&D activities (Wu & Li, 2015). It is in alignment with (Wu & Zhang, 2010)'s view that latecomer companies can use the emerging technological paradigm shifts as an opportunity to race to the frontier and produce secondary innovation without the heavy technology investments that the pioneer endured. Wu & Zhang, (2010) indicate that Chinese firms with disadvantaged backgrounds have skipped some of the sequential steps of the traditional models and still managed to achieve technological advancement and produce endogenous innovation.

The framework suggests that firms from low to middle income countries can build innovation capabilities that lead to technology development which first meets local market demands using the knowledge of the market they operate in while also achieving economic growth at a firm level ultimately benefiting the country and an

industry that is already dominated by multinational corporations (MNCs) bypassing the cost incurred by the primary innovator. Wu & Zhang (2010) further assert that the size of country, big population combined with the significant domestic customers' unique demand of technological solutions could not be met by the standard technology from the MNC.

Wu et al.(2010) argue that MNCs do not consider emerging economies as most important and therefore avoid the cost and risk associated with building a new business mode in emerging countries that is different to the one operational in strategic economies. MNCs take long to adapt emerging disruptive digital technologies due to a mature BMI. It is a challenge to change the business processes to suit the disruptive technology and meet customer demands. The big unserved market led to an emergence of latecomer firms that achieved sustainable economic growth. Thus, the latecomer companies were able to adapt the emerging technology faster than the mature technology that has gained traction in the developed countries. Hussain et al. (2019) and Boumphrey (2014) confirm that even though latecomer companies from emerging countries are strapped by their country's challenges such as lack of infrastructure, low levels of technological capabilities and diverse market segmentation, they have still managed to gain a competitive advantage against the MNCs and advance economically.

Wu & Zhang (2010) and Wu et al., (2010)agree that latecomer companies with disadvantaged backgrounds such as those of Chinese companies can take advantage of emerging digital technologies and the local network partnership to capture value and achieve technological advancement that propels the companies to gain a competitive advantage. Wu & Li (2015) further confirm that the Chinese IT Companies Alibaba, Tencent and Baidu, informally known as the BAT firms, took advantage of the popularity and growth of the internet. The BAT group has developed an innovative environment that allows small and medium enterprises within China to trade and sell their products globally creating a huge business ecosystem. However, Hansen & Ockwell (2014) encourage latecomer companies in the same industry to collaboratively build basic technological operating capabilities as a key learning source.

The local latecomer companies were able to improve the imported technology following the emerged secondary innovation model which is dynamic in nature. According to Wu & Zhang (2010) Chinese ICT companies put emphasis on speed of service delivery and customisation as key differentiators against MNCs. Wu et al., (2010) agree with this finding and confirm that Chinese firms focused on quality and price of disruptive technologies as differentiators. Wu, Ma, & Xu (2009) confirm that the dynamic secondary innovation model is based on two phases namely standard secondary innovation, where mature foreign technology is acquired as acquisition I and advanced secondary innovation where emerging technology is acquired, acquisition II. They further argue that the model relies heavily on government policies to facilitate and build the required technological capabilities.

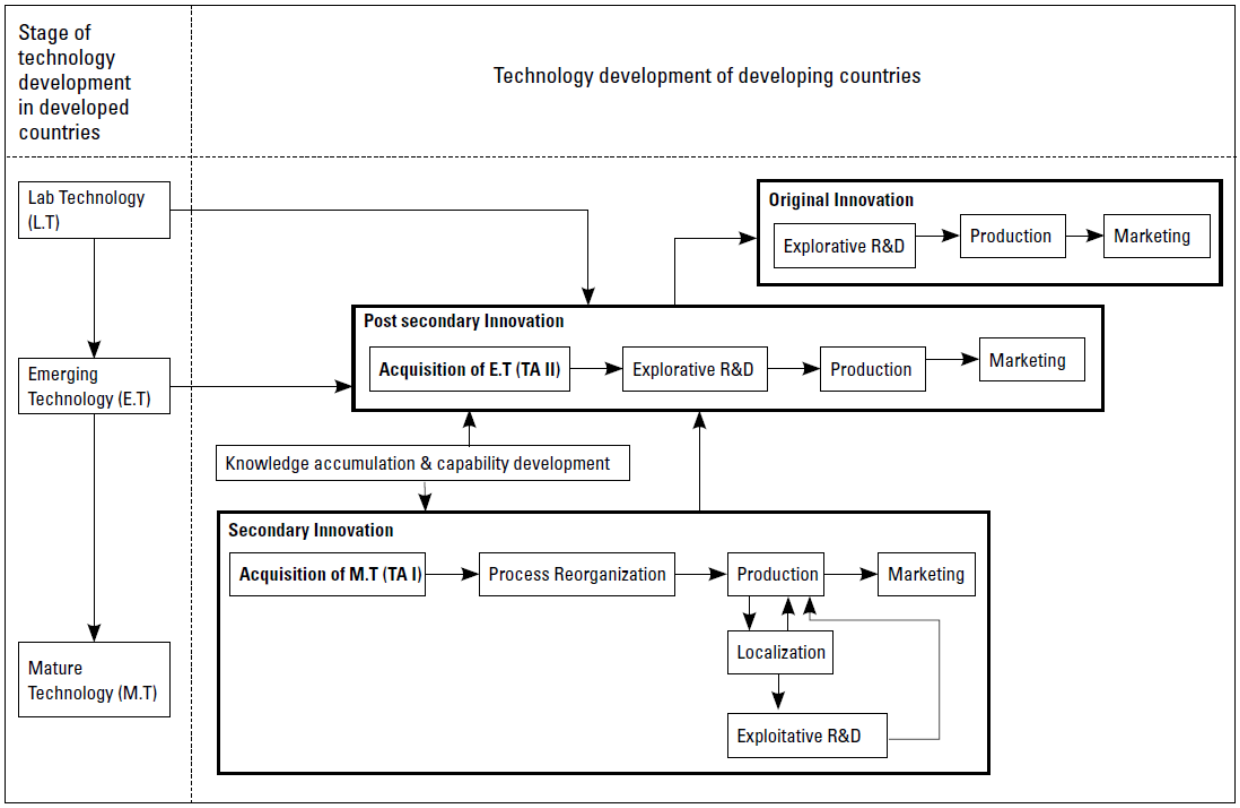


Figure 1: Dynamic secondary innovation model process. Sourced from Wu & Li,(2015).

According to Wu & Li. (2015) in acquisition I latecomer firms can benefit from mature technology without incurring the research and development cost and overcoming market entry barriers as illustrated in *Figure 1*. The standard secondary innovation phase is like the industrial technology development model where firms focus their efforts on implementation, assimilation, and improvement of mature foreign technology (Wu & Li, 2015). This pattern however makes it difficult for latecomer firms to achieve sustainable economic growth and catch-up with the incumbent technology developers. Wu & Li (2015) further stated that latecomers can however use technological change to their advantage, with an emerging technological trajectory the latecomers can catch up with the incumbent by acquiring emerging technology in the early development stages of technology as a step towards producing endogenous innovation.

According to Wu & Li (2015), latecomers have the opportunity to leverage technological change to their advantage. By aligning themselves with an emerging technological trajectory, latecomers can narrow the gap with the incumbent players. This involves acquiring emerging technology during its early development stages as a strategic move toward fostering endogenous innovation.

This phase is referred to as advanced secondary innovation – acquisition II. The latecomer companies can combine the emerging technology, domestic research capability and advanced technological capability gained by learning from the assimilation and improvement process in acquisition I to develop and produce endogenous innovation (Wu & Li 2015). Figure 1 illustrates how companies from emerging markets can use the dynamic secondary innovation model to advance to original innovation.

It is very crucial for the firm to match and combine the technology acquired with the firm's internal circumstances, such as existing technology, skills, and R&D capabilities. Matching is applied to mature, emerging, or new technology acquired. According to Xu & Wu (1992) the combination of acquired technology with the firm's internal environment is what lays the foundation of the dynamism and innovation pattern to be developed in the later stages of secondary innovation. Each firm operates in different settings and circumstances, and therefore, adapting the technology to both internal and

external factors will determine the level of learning and success. The initial stages of technology acquisition are what helps the firm build advanced technological capability by learning and understanding how the technology is configured and works. Secondary innovation consists of varied types of innovation that happen along the process of the model in a dynamic fashion. It does not just happen at a specific point.

The advanced technological capabilities, combined with knowledge of the domestic market stimulates improved firm innovation capabilities to produce endogenous innovation. The framework explicitly explains the different stages of technology development that firms from developing countries follow and how those firms can learn from the acquired mature technology, then use emerging technology, to original lab technology using research and development. (Xu & Wu, 1992).

2.3 Technological capability building and secondary innovation.

“An organisation can acquire technological knowledge by unpacking and putting together technology to perform in a different economic environment to its original environment (Kim, 1997).” Technological capability has been defined as the company’s ability to design and produce new products and processes while accumulating knowledge and skills about the technological systems to produce products and processes that lead to the company’s desired performance and capability products (Wang et al., 2006). According to Wu & Li. (2015), technological capability building enables technological catch-up because of organisational learning. For latecomer companies to achieve technological upgrading that leads to original innovation the company must accumulate indigenous technological capabilities (Kim, 1980). Marcelle (2011) asserts that technological capability building is the ability is the ability to perform certain tasks, while technological development is the accumulation of capabilities. On the other hand, Kim (1997) argues that technological capability gives a company an improved ability to manipulate external forces while the transfer of it gives the company enhanced ability to learn and accumulate knowledge to improve technological capability.

According to Figueiredo (2002) technological capabilities are the company's assets required to develop and manage technological change such as organisational systems, knowledge, skills, and experience. According to Hansen & Ockwell (2014), accumulation of technological capabilities is a process that enables the company to gradually build knowledge and skills that enhance the capability to adapt and manage technical change. Furthermore, the technological capability at a firm level is mainly accumulated through foreign network partnerships, local domestic network partnerships and internal efforts (Hansen & Ockwell, 2014).

The secondary innovation framework emphasises the collaboration and interconnection between the main three sources of technological capability accumulation, namely? the imported technology, local market conditions and the domestic technological ecosystem as 'understanding' (Wu et al., 2006). The secondary innovation capability development process shown in *Figure 2* highlights how latecomer companies build and accumulate knowledge through the interconnection and collaboration of imported technology and internal resources.

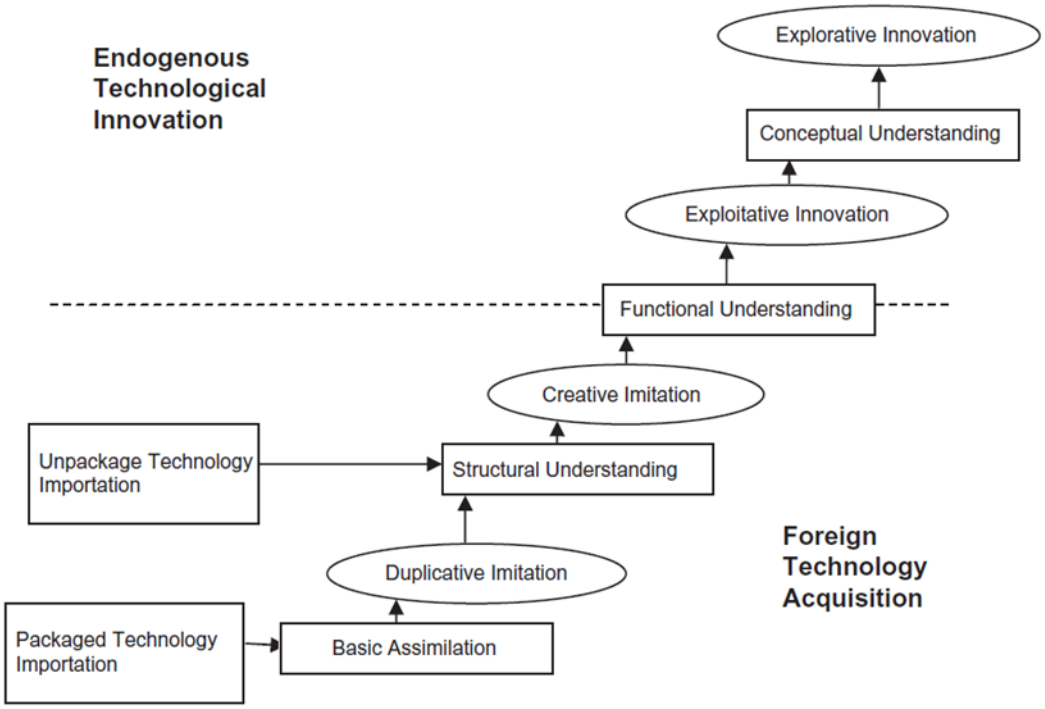


Figure 2: The capability building process in latecomer companies. Source from (Wu et al., 2006)

Since secondary innovation involves a cumulative process of evolution, as stated (Wu et al., 2006), it occurs in four distinct stages as illustrated in *Figure 2.* These stages are interconnected with technological capability stages, namely “duplicative imitation, creative imitation, exploitative innovation, and explorative innovation”.

2.3.1 Duplicative Imitation

Firms in less developed countries (LDCs) acquiring foreign technology can assimilate it to solve problems in the local market while creating knowledge. Sourced technology includes equipment, manuals, and blueprints as documented by (Kim, 1997). On the other hand, Wu, Ma, & Xu (2009); Wu, Ma, Shi, et al. (2009) assert that fundamental assimilation of technology sourced from developed countries, in a form of packaged technology, constitutes the initial step of secondary innovation. According to Kim (1980)

assimilation of imported technology enables the latecomer company to accumulate basic design and product operations knowledge. Kim (1997) further argues that duplicative imitation is a strategic process of industrialisation in emerging countries to achieve catch-up. He confirms that duplicative imitation is an easy process to achieve. According to Hansen & Ockwell (2014) at this stage technology is new to a latecomer company, which builds basic capabilities for operations, although it is at the lower end of technological capability building.

2.3.2 Creative imitation

Latecomer firms interact with the sourced technology, by adapting the technology to the local environment Wu, Ma, & Xu (2009) and Wu, Ma, Shi, et al. (2009) using endogenous capability that is built in the basic assimilation phase and localising the technology (Kim, 1997). This stage is called structural understanding. Kim (1997) and Kim & Lee (1987) advises that local firms produce enhanced products that suits the local market using the indigenous engineering and production capabilities accumulated from basic assimilation. Hansen & Ockwell (2014) argue that basic production capability provides the latecomer firms with the ability to make use, manage and produce small production improvements on existing technology.

Viotti (2002) indicates that the above process is called production capability but asserts that “developing nations participate in a ‘passive learning strategy’ when they acquire technology from industrialised countries and only absorbed it in the local market with improvements”. According to Viotti (2002), emerging countries are engaged in learning from innovations produced elsewhere, and consequently, they may be perceived as less innovative. However, Xu & Wu (1992) asserts that implementing imported innovation from one country to another country or industry is deemed as secondary innovation. Kim (1997) asserts that latecomer companies produce duplicate products with improve performance with a lower cost than the original product, achieved through significant learning.

2.3.3 Exploitative innovation

According to the work done by Wu, Ma, & Xu (2009), local Chinese firms improved the localised technology by penetrating different segments of the domestic market following the domestic market requirements. Kim (1980) referred to this stage as the improvement stage, while (Wu, Ma, & Xu, 2009) referred to it as functional understanding. The latecomer companies use endogenous design capability that was built in the previous stage to improve the technology (Kim, 1997). Wu, Ma, & Xu (2009) remarks that domestic customers play an important role in this stage by specifying their unique requirements creating a demand pipeline for the local production firms to meet the user requirement. This kind of demand is referred to as technology pull when the market demand improved technology capability. According to Kim (1997) the ability to improve imported technology is continuous, with learning and knowledge accumulated from assimilation and creative imitation leading to improvement.

Hansen & Ockwell (2014) affirm that latecomer companies that produce technological improvements that are new to the local market or industry, or are vastly different to the original design, are referred to as having achieved 'basic innovative capability'. Innovative capabilities highlight the company's assets to produce new or substantially improved technology.

2.3.4 Explorative innovation

According to Plechero (2013), companies with increased innovative capabilities can master the production of technology that delivers a higher level of complexity and innovation. Wu, Ma, & Xu (2009) and Wu et al. (2006) advise that the latecomer company can combine the high-level technological capability accumulated in the above three stages with emerging technology, local research, and development capabilities to produce original innovation. The study conducted in China by Wu et al. (2006) affirms that latecomer companies had achieved creative imitation and were in the process of implementing exploitative innovation; however, they had not yet reached the stage of explorative innovation. In the study conducted by Hansen and Ockwell (2014) the author points out that Malaysian companies that achieved innovation capabilities did so

by deliberately investing in the companies' learning process. It is the company's responsibility to take advantage of the learning platform and opportunities presented by international companies (Hansen & Ockwell, 2014). Companies that were determined to develop innovative capabilities and made concerted efforts by investing money in building R&D capabilities, assigning human resources to learn from external network partners have achieved advanced technological capabilities (Hansen & Ockwell, 2014). Figure 2 illustrates how Chinese companies managed to achieve endogenous innovation by exploring the knowledge accumulated from duplicative and creative imitation stages of secondary innovation.

2.3.5 Factors that promote technological upgrading

2.3.5.1 Market Conditions

These refer to the development of new technology which stimulates the need for technological change in the market which is backed by the industrial policy set by government. As the demand and supply of the technology increases, it strengthens the technological capability of the firm enabled by the science and technology policy (Kim, 1997).

The market conditions prompted technology development policies, and were arranged in three categories: Policies that increase the demand of technology, while stimulating the market technology requirements, policies that enable technology supply which enhance technology capabilities, and policies that link both the demand and supply of technology to ensure that the technological innovation is fit for purpose and commercially viable. According to Kim (1997), the market conditions encompass both the demand side and the supply side of technology development. On the demand side, it involves creating market needs for technological change, thereby fostering the demand for innovative solutions. Simultaneously, on the supply side, the market mechanism perspective focuses on strengthening technological capability, ensuring that there is a robust capacity for developing and supplying advanced technologies to meet the identified market needs. This dual emphasis recognises the interplay between

stimulating demand for technology and enhancing the capability to supply and innovate within the technological landscape.

The market conditions played a pivotal role in prompting the Korean government to formulate technology development policies aimed at fostering technological learning within firms to attain international competitiveness. These technological policies were organised into three key categories: First, there were policies designed to augment the demand for technology, thereby stimulating market requirements for technological advancements. Second, there were policies crafted to facilitate technology supply, thereby enhancing technological capabilities. Finally, there were policies intended to establish effective linkages between both the demand and supply of technology, ensuring that technological innovations were not only fit for their intended purposes but also commercially viable.

Kim (1997) further advises that firms invest in innovation activities such as capability building when there is a competitive market to upgrade the products and processes, backed by an efficient and effective public R&D facility. The scholar further advises that countries that lack in local technological capabilities fail to industrialise and grow. Without local technological capabilities, firms will battle to achieve technological upgrading which leads to sustainable economic growth.

Industrialising countries might end up producing less innovation in the absence of an effective research and development system with incentive programs that link both the demand for new technology and the supply. Industrialising countries such as Korea have used tax and financial incentives as tools for linking supply capabilities with the demand for innovation (Kim, 1997). On the other hand, the ability to diffuse the acquired technology country wide leads to technological capability upgrading. The efforts to adapt and assimilate the technology at a firm level.

2.3.5.2 Technology Flow

The technology flow perspective, encompassing technology transfer, technology diffusion, and indigenous research and development (R&D), offers valuable insights into understanding the mechanisms through which developing countries narrow the

technological gap with advanced nations (Hoekman et al., 2005; Kim, 1997; Rigo, 2021).According to Kim (1997) this phase enables the latecomer firm to upgrade the technological capability by acquiring technological capabilities as an entry to market. Lastly the local firm uses its indigenous capabilities to improve the use of the technology in the local economy. This process includes reverse engineering, efforts to copy the technology as the Korean electronics firms did in the late 1980's (Kim, 1980). When a latecomer firm assimilates the technology, it can produce a similar product using imitation, or reverse engineering. Kim (1997) further advises that these activities play an important role to achieve industrialisation as well as catching up with DC. Through the intensified indigenous research and development activities the firms were able to enhance their technological capability by learning from research.

2.3.5.3 Time

According to Kim (1997) and Wu, Ma, & Xu (2009) a time-sensitive analysis influences how individual cycles of technology flow and the effects of various market conditions—such as demand, supply, and linkage—vary in relative impact as an industry progresses through different stages of development over time, also referred to as a dynamic perspective. Latecomer companies can apply the three stages of industrial technological development not only to mature foreign technology, but they can also do so with growing and emerging technology in developed countries. The local firms can acquire, assimilate, and improve mature technology, then acquire, assimilate, and improve growing technology, as well as acquire, assimilate, and improve fluid technology that is emerging in the developed countries (Kim, 1997). By applying this process over time successfully, the latecomer companies eventually build solid local technological capabilities that enable it to generate emerging technology in the fluid stage of technology in DC, thereby challenging the pioneers and achieving sustainable economic growth.

Chen et al. (2018) propose a unique innovative holistic innovation (HI) paradigm as a framework that companies in China as well as emerging markets can use as an approach to upgrade the technological innovation capability and achieve global

competitiveness and leadership. Chen et al. (2018) and Chen & Yin (2019) suggest that HI provides the latecomer companies from emerging markets with a complete and organised method of combining the organisational design, industrial trends, strategic design as well as the ingrained local culture to define a sustainable innovation capability and competence over time. However according to Peng et al. (2022) for latecomer firms to complete directly with incumbent multinationals in the global market, they must build sustained technological upgrading by further enhancing their innovation capabilities. Peng et al. (2022) further advise that the latecomer companies are challenged by decisions to develop further innovation capabilities without compromising the existing technological capabilities as well as the gained market share. Latecomer companies can do so by employing ambidextrous learning strategy, which proves to be a challenging exercise as the latecomer company has to contradictory goals of maintain the achieved growth capabilities and exploring innovation frontier (Peng et al., 2022).

Peng et al. (2022) conclude that it is in the best interest of latecomer firms to explore a continuous ambidextrous learning strategy to overcome the late mover disadvantage and obtain a positive impact in competing with the leading multinationals.

2.4 Secondary Business model innovation

According to Wu & Li (2015), the secondary innovation framework not only focuses on technological innovation, assimilation of imported technology and dynamic change of technology with technological paradigms, it also covers BMI to enhance the understanding of springing to the front by differentiating from the traditional business models ingrained in MNCs.

BMI provides guidance in developing a commercial model for emerging technologies in the domestic market. Latecomer firms must look at how they rearrange their production, marketing and sales activities and resources to benefit from emerging technologies. It also looks at building the network ecosystems consisting of partners, research institutions as well as other partners in their industries locally and internationally to better meet the customer requirements.

A business model is a theoretical tool made up of a set of elements and their interrelations to articulate the business logic in a specific company. It therefore takes into consideration the value offered by a company to customers and the network ecosystem which enables value delivery as well as the profit generated from sustainable revenue streams (Osterwalder et al., 2005). Business models were derived from a growing need for companies to produce and capture value from innovation (Teece, 2010). BM is regarded as an innovation subject compared to products and service (Baden-Fuller & Haefliger, 2013).

Numerous literature studies on business model innovation have been conducted in the past years, each providing varying definitions. For the purposes of this paper, we will use the definition from (Santos et al., 2009), which states that “Business-model innovation (BMI) is a reconfiguration of activities in the existing business-model of a firm that is new to the product/service market in which the firm competes.” According to Wu et al. (2010), BMI is a favourable method for companies to make changes in the value creation sources during volatile times. Afuah (2018) suggests that BMI can be used to build new capabilities that are different to the existing capabilities to capture value from the new products or services. According to Giesen et al. (2007) and Johnson et al. (2008) BMI will supersede product and service innovation. It is gaining more traction and yielding better results in terms of higher value and economic growth.

Wu et al. (2019) suggest that for MNCs operating in emerging countries, their leading business model in the home country is generally impacted by the emerging country’s market condition and dynamics, legislation and social circumstances which pose challenges. The home country’s business model must be adapted to the host country’s market to overcome the challenges posed by the emerging country’s market conditions. Wu et al. (2019) further suggest that MNCs can however apply an adaptive BMI by customising their business models to align with the emerging country’s institutional and market conditions to obtain legitimacy and meet the host country’s social value while creating value.

However, latecomer companies that import technology from pioneering companies have the mammoth task of finding a process of capturing value from the technology in their

local domestic market. Wu et al. (2010) suggest that latecomer companies must redefine the imported technology and how it is provided to the domestic customers. As already mentioned above, when the MNCs try to implement their pioneering business model from home countries, these mature models fail to produce the desired results in emerging countries. According to Codini et al. (2023), BMI present SMEs from emerging countries with an opportunity to pivot and explore new opportunities by conducting business and performing activities in a different manner that is more aligned with the new innovated business model.

Latecomer companies can adapt the business model from MNCs and redefine and implement it in their local country. The process of modifying and adapting the original business model from the pioneering countries in a local domestic market taking into consideration the domestic market condition is referred to as secondary business-model innovation coined by (Wu et al., 2010). In a research conducted by Mehrotra & Velamuri (2021), the term "secondary business model innovation (BMI)" is used to denote an outcome attained by latecomer companies through the process of learning and enhancing their comprehension of (MNC) BMIThe latecomer companies then combine the knowledge obtained with the internal experience, the technological change and adapt the BMI to the local domestic market to create a secondary BMI (Mehrotra & Velamuri, 2021). A business model can influence the internal resources as well as be influenced by external influence such as technological innovation like digital technologies (Ancillai et al., 2023).

Business Model Innovation (BMI) offers companies a competitive advantage that is challenging to replicate, especially when compared to product and service duplication, as highlighted by (Zott et al., 2011). Aligning with this perspective, Ancillai et al. (2023) and Teece (2010) support the notion that BMI is a dynamic process enabling companies to adapt their business activities and functions. It emphasises the exploration of new architectural designs to maintain a competitive edge. On the other hand, Teece (2010) and Johnson et al. (2008) further advise that a business model (BM) serves as the

architectural design process through which businesses create, deliver, and capture value.

2.4.1 Three dimensions of BMI

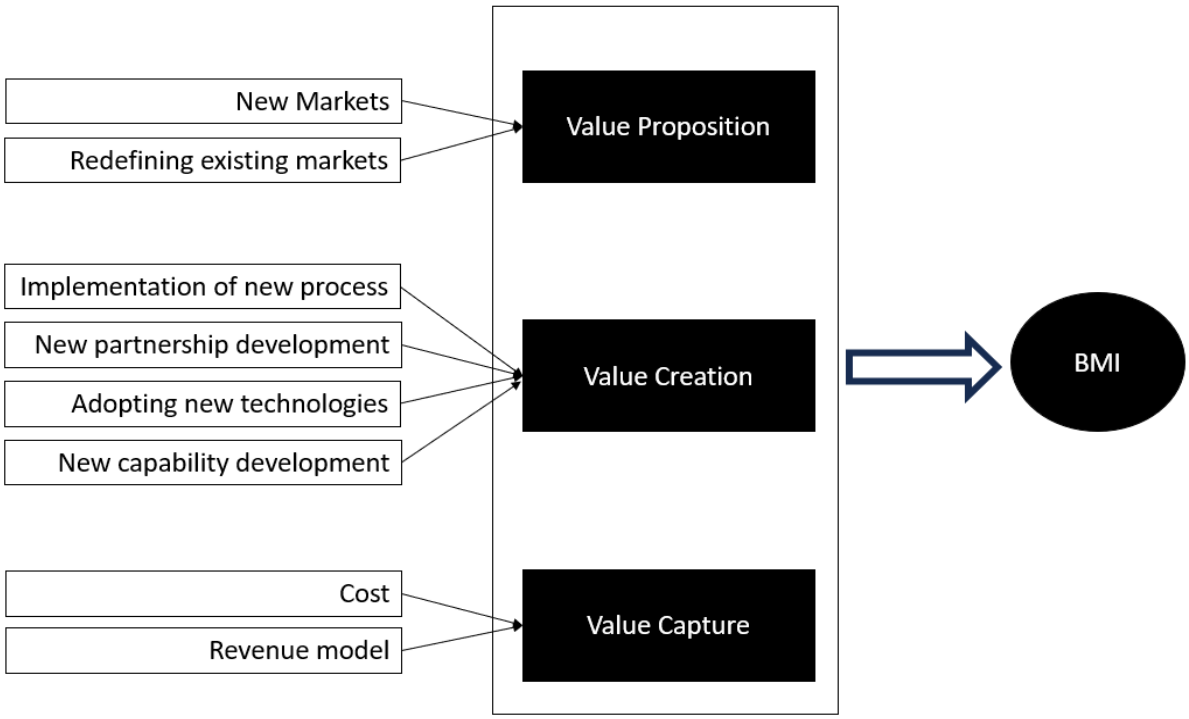


Figure 3: Business Model Innovation dimensions

A business model innovation is elucidated through three central dimensions: value creation, value proposition, and value capture as illustrated in **Error! Reference source not found.** (Weerakoon & Kodithuwakku, 2023). The value proposition dimension of a business model delineates the solutions provided to customers and outlines the mechanisms through which these solutions are offered. As noted by Baden-Fuller & Haefliger (2013), companies strive to enter new markets or redefine existing ones by identifying customers who are both capable and willing to pay for the products or services they provide. This strategic approach allows companies to address their customers' problems or fulfil their needs in novel or improved ways (Clauss, 2017).

The value creation dimension elucidates the activities involved in generating value, as highlighted by Chesbrough (2010) with the aim of enhancing the utility of a product for customers. According to Weerakoon & Kodithuwakku (2023). This dimension encompasses the implementation of new processes, the establishment of new partnerships, adoption of new technologies and the development of new capabilities. Relational rents, which cannot be developed independently by an existing firm are identified, and leveraged through the formation of new partnerships. Additionally, technological advancements, including the utilisation of digital technologies and platforms, play a crucial role in facilitating the introduction of innovative solutions (Ancillai et al., 2023).

According to Carvalho & Jonker (2015) value capture, is the difference between revenue and cost retained by the organisation. It signifies the firm's strategy for securing profits from the value creation process and distributing generated profits among participating actors, as indicated by (Clauss, 2017) . These activities empower providers and customers to establish how the additional value created should be distributed between the provider and the customer (Bowman & Ambrosini, 2000), ensuring that a maximum portion of the value is captured or appropriated by the firm.

Latecomer companies can capture value from disruptive technologies by articulating and positioning the value of the emerging technology through using a commercial model which is appealing to customers who are price sensitive. Furthermore, the latecomer companies must build a unique partner network ecosystem for the latecomer company to deliver value to the customers using the custom commercial model through the distinctive complementary assets from the partners (Wu et al., 2010).

Achieving legitimacy involves integrating the firm's activities with the network ecosystem in which it operates. The alignment between business activities and the network ecosystem significantly influences the business model adopted by the companies. In South Africa there is Black economic empowerment policy which aims to encourage participation of the black population in the economy. A Black owned IT companies will by default hold regulatory legitimacy and work toward achieving the other normative and

cognitive legitimacies. This regulatory legitimacy can also be extended to MNCs that seek to operate in South Africa by partnering with a local latecomer firm.

According to Lew et al. (2023) companies in emerging markets frequently do not have revolutionary products and services. Instead, they depend on unique business models that are less likely to forecast success in a different country context. This uniqueness makes them challenging to replicate, particularly due to the considerable diversity across countries within emerging markets. Latecomer companies in South Africa can focus on BMI by to achieve economic growth and a competitive advantage against MNC's. Codini et al. (2023) advices that exaptation can serve as a valuable mechanism for SMEs to navigate innovative business opportunities and trajectories. It provides a means for these enterprises to address their technological and organisational weaknesses during the innovation process. Exaptation, in this context, involves repurposing existing resources, capabilities, or technologies for novel and unanticipated uses, thereby enabling SMEs to explore diverse avenues for creating, delivering, and capturing value (Andriani & Carignani, 2014; Codini et al., 2023).

In essence, exaptation encourages latecomer firms to think beyond traditional boundaries, encouraging a mindset that values flexibility and creativity in problem-solving. According to Codini et al. (2023) adapting existing resources for unexpected applications, SMEs or latecomers firms can enhance their ability to compete in dynamic markets and navigate the challenges of the innovation landscape. This adaptive approach helps SMEs stay resilient and agile, allowing them to respond effectively to changing circumstances and discover alternative routes to success (Andriani & Carignani, 2014).

Exaptation can be a valuable process for SMEs, empowering them to explore innovative business opportunities and discover novel approaches to create, deliver, and capture value using BMI. According to Codini et al. (2023) addressing the technological and organisational weaknesses in the innovation process, SMEs can effectively leverage exaptation in BMI. Specifically, when a new functionality emerges, SMEs seize the opportunity for value creation(Codini et al., 2023). This pivotal stage marks the inception of a fresh value proposition, enabling SMEs to identify and cater to new

customer segments. Co-development with prospective customers becomes a central focus during this phase, with key BMI activities and accumulated resources over time playing integral roles in shaping the dynamics of value creation.

2.5 Comparison between China and South Africa

Based on the literature review a combination of secondary innovation framework and BMI was applied successfully in China by latecomers to develop secondary innovation. The latecomer companies leveraged emerging technologies to leap to the front and achieve economic catch-up. African countries have the similar characteristics that China had prior to achieve economic catch-up outlined below and as such African countries might benefit from adopting and following the secondary model. This paper will seek to understand the process that South African emerging IT firms have followed to produce secondary innovation and technological upgrading.

Table 1: Comparison between China and South Africa. Data Sourced from (Country economy, 2023)

Characteristics	**China**	**South Africa**
Size of the country	**9, 596,960 sq. km**	**1,219,090 sq. km**
Large Population	1.4 billion	60 million
Infrastructure	Reliable optimal infrastructure	Lack of infrastructure (Electricity, water roads)
Industrialisation	32% of world industrial production (Ekekwe, 2019).	Industrial production index average rate of 2.7 % (CEIC Data, 2023).
Unemployment rate	4.1%	28.8%
Poverty	0.6% live below poverty line	16.6% live below poverty line

According to Wong (2011) the premier of China made a concerted effort to eradicate poverty and build a reliable infrastructure by investing CNY 4 trillion post the global financial crisis in 2008. 37.4% of the investment was spent on transport and power infrastructure such as airports, railroads, electricity grid and roads (Wong, 2011). China successfully eliminated rural poverty and reduced regional income disparities through the rural revitalisation program, as highlighted by (Liu et al., 2020; Xiaoyun, 2014). The authors assert that China's achievement was marked by the establishment of a technology-rich, independent, and large-scale industrial system. This development positioned China as the world's leading manufacturing nation by surpassing the United States in 2010.The author further confirms that China's manufacturing accounts for 19.8 % of the world's manufacturing output in 2012 (Xiaoyun, 2014)

There is a huge difference between the size of China and South Africa as illustrated in *Table 1*. Therefore, the Secondary innovation framework that work in China can work partially in South Africa. Given the size of the country, China has a bigger domestic market and benefits from economies of scale derived from the market which allows the latecomer companies to achieve technological upgrading due to the demand and the ability to provide products to a bigger domestic market (Grinsted & Eugene, 2021). While South Africa is a fraction of China, it is eight times smaller than China, with the African free trade which is formulated to encourage trade flow within the African continent across all sectors of the economy, South African latecomer IT Companies can benefit from this trade agreement and achieve economies of scale (AfCFTA, 2022). Kaplinsky and Kraemer-Mbula (2022) point out that government has a role to play in facilitating cross-border trade within Africa by reducing the trade barriers, which will allow the latecomer firms to achieve economies of scale in their businesses.

In Xiaoyun (2014)'s view Africa can learn from China's industrialisation process, but it is critical to strengthen the role of government and agriculture as the most important areas for consideration. African must develop an industrialisation strategy with well-defined terms of agreement within the region to take advantage of the economic development opportunity for industrialisation (Xiaoyun, 2014).

2.6 The role of government in enabling technology upgrading for companies in LDC

According to Kim (1980, 1997), government plays a critical role in enabling technological upgrading for local firms in LDC. Kim (1980, 1997) further asserted that Government's role is to create policies that encourage and facilitate industry technological learning to improve the latecomer companies' competitiveness in a global economy. Xiaoyun (2014) agrees with this view and suggest that for Africa to industrialise the countries must be clear of the role the government must play to achieve successful economic progress under the current global economic system. Oyelaran-Oyeyinka (2014) mentioned that the innovation policy creation is one of the important roles that government plays in achieving sustainable economic growth using organisational transformation. The scholar argues that East Asia has managed to achieve structural change because of the government in those industrialising countries developing effective innovation policies that build and changed organisations (Oyelaran-Oyeyinka, 2014). These deliberate government actions facilitated the creation, adoption, diffusion as well as transfer of knowledge.

Xiaoyun (2014) agrees and confirms that Africa is however faced with brain drain which is preventing it from developing the local intellectual property required to produce endogenous development strategy and policies. The scholar further advised that government must develop an overarching framework that will take into consideration the varying priorities of the country's developmental goals as well as secure the financial capacity and intellectual capability required to conduct research and create a national industrialisation framework (Xiaoyun, 2014) with less reliance on external resources.

According to Malikane (2015), government's ability to provide consistent and reliable public infrastructure such as transport, water, and electricity has huge positive impact towards productivity while improving competitiveness of the local companies. The ability for companies to have access to quality public infrastructure developed by government is an imperative element of a viable business environment (Malikane, 2015). While Oyelaran-Oyeyinka (2014) believes that lack of physical infrastructure like electricity inhibits economic growth, the deliberate government investment in the development of

infrastructure has huge benefits for countries that have lower levels of development by encouraging economic growth (Oyelaran-Oyeyinka, 2014).

Kim (1997) stated that policies are used to encourage technological capability building in less developed countries by government. The South African government has developed a white paper called STI Policy, it is an equivalent of a National Systems of Innovation which seeks to outline South Africa's conceited effort to promote and encourage technological innovation within the country for economic development (DST, 2019). The policy seeks to define a system for knowledge creation and application to promote the country's economic and social development agenda, by encouraging the participation and interaction between the multiple economic actors (Manzini, 2012).

The adoption of this policy enables the achievements of the 14 key areas in the National development plan. One of them is to pair small and medium enterprises with large business which will result in technological capability building when implemented properly. The white paper also states that several policy approaches will be introduced to improve innovation in South Africa, which include a move beyond R&D to a broader concept of innovation (DST, 2019) . Again, the introduction of the skills development levy in 1999 by the South African government is yet another indication of policies that build capability within the country. This Act encourages companies to invest in employee training and development.

Furthermore, the president of South African has established the 4IR commission which is geared at formulating a framework to formalise the adoption of 4IR as a country and priorities initiatives that encourage economic growth because of this technological paradigm (Gazette, 2019). According to Marwala (2020) and Lambrechts et al. (2020), 4IR presents opportunities that can position South Africa as a global competitor. The South African Latecomer IT companies can take advantage of these policies to build technological capabilities as well as products and services that will address the challenges faced by the country. Kaplinsky & Kraemer-Mbula (2022) believe that the successful diffusion of 4IR digital technologies requires policies that enable the inclusion of marginalised and unserved populations.

2.7 Secondary Innovation in emerging IT industry

The exponential growth of the Information Technology (IT) sector in recent years has positioned it as a strategic and critical industry vital for national economic survival and poverty reduction. This recognition, as highlighted by Cuevas-Vargas et al. (2021) ; Bi et al. (2011); Sung (2009), emphasises the pivotal role played by the government in setting a clear intent and strategy to establish leadership in the IT market, a trend observed in countries like Korea, Brazil and India. The success stories of Korea, Brazil and India in growing their IT industries can be attributed to the strategic intent set by their respective governments.

Mathur (2006) asserts that the IT sector provides countries with a competitive advantage in the global, competitive, and dynamic economy. This ambition fosters the formation of IT companies supported by government initiatives, aligning with the strategies employed by both Korean and Chinese governments in building their manufacturing industries, as highlighted by (Kim, 1980; Wu & Li, 2015).

Mathur (2006) and Cassiolato et al. (2006) emphasises the importance of technology transfer from Research and Development (R&D) to the market for businesses to thrive. This aligns with the explorative innovation stage illustrated in Figure 2 of the capability-building process in the Secondary Innovation Framework. Key components such as technology diffusion, accumulation, application, and transfer are identified as critical elements of a sustainable economic growth strategy. Korea successfully employed its IT strategy to recover from the economic crisis in 1997, (Mathur, 2006) propelling the country towards sustainable economic growth. The success of Korea's IT strategy in becoming a globally recognised IT growth model involved active engagement in technology transfer as market entry strategy.

Technology transfer, defined as the sharing or dissemination of knowledge, skills, or technology between individuals, organisations, or countries, encompasses the transmission of technical and scientific knowledge (Dubickis & Gaile-Sarkane, 2015; Keller & Chinta, 1990; The Journal of Technology Studies, 2009). This process involves the transfer of technologies, innovations, and know-how through various means,

including collaboration, licensing agreements, joint ventures, partnerships, and the exchange of personnel between institutions. In the Secondary Innovation Framework, technology transfer emerges as a critical element in the journey of technological capability building.

According Mathur (2006) IT companies in India leveraged various factors such as government-diaspora relationships, software technology parks, collaborations between the private and public sectors, and private initiatives to establish itself as a preferred global IT sourcing base. The Indian IT industry has positioned itself as a leader in global delivery models, offering service propositions beyond cost considerations, emphasising innovation and quality (Mathur, 2006). This industry has experienced rapid growth, outpacing the overall economic growth of the country.

Mathur (2006) further advice that the inception of the Indian IT industry can be traced back to IBM's unbundling of software from hardware in the 1960s. Additionally, the inability of multinational corporations (MNCs), such as IBM, to meet local Indian enterprise requirements, coupled with the government's mandate for MNCs to reduce their Indian subsidiaries' equity to 50%, played pivotal roles in its formation. Training institutes like NIIT, offering Information Technology courses like COBOL programming, contributed to India's ability to fulfil the demand for Cobol programmers during the Y2K era to the US to perform database conversions.(Mathur, 2006) The IT outsourcing business proliferated with the establishment of MNC branches in India and partnerships between MNCs and Indian IT companies in joint ventures for specific project processes. This collaboration led to American companies shifting their software development operations to India (Mathur, 2006). Favourable government policies, encouraging MNC branches in India to engage Indian IT companies for manufacturing activities, and the cost advantage of Indian software programmers compared to their American counterparts, along with their proficiency in English, were instrumental in the emergence of the Indian IT industry.

In another emerging market, Brazil, a successful implementation of an IT strategy and the development of indigenous technological capabilities were facilitated by government policies, similar to the approach taken by India (Botelho et al., 1999; Cassiolato et al.,

2006). In the 1980s, the Brazilian government formulated policies to promote IT development and diffusion within the country(Cassiolato et al., 2006). Much like China, Brazil protected its IT environment from global market competition to foster the development of the domestic IT industry (Botelho et al., 1999; Cassiolato et al., 2006; Wu & Li, 2015b). However, due to limited funding, the country struggled to attract sufficient financial investment from multinational corporations (MNCs), hindering the local IT industry's progress beyond being technology licensing providers.

Following the liberalisation in the 1990s, a new IT policy was introduced to support R&D activities and assist local IT equipment manufacturers. According Cassiolato et al. (2006) and Botelho et al. (1999) to the liberalisation policy in Brazil catalysed the emergence of the software and service industry, there was a significant shift in the country's economic landscape. The policy, introduced in the 1990s, marked a departure from the protective measures of the past, allowing for increased participation of multinational corporations (MNCs) and fostering a more dynamic and globally connected IT sector (Cassiolato et al., 2006).

The software and service industry in Brazil experienced notable growth because of this liberalisation . The policy changes created an environment conducive to partnerships between local IT companies and MNCs, leading to a substantial influx of foreign investment and expertise. This shift allowed Brazil to tap into the global software market and establish itself as a competitive player. Moreover, the liberalisation policy spurred innovation within the Brazilian IT sector. Local companies, adapting to the changing landscape, embraced Business Model Innovation (BMI) to revamp their strategies and business models (Baden-Fuller & Haefliger, 2013; Osterwalder et al., 2005; Teece, 2010). The focus shifted from hardware production to software development and services, aligning with the evolving needs of the global market.

Because of these policy-driven changes, Brazil witnessed the formation of a robust software export sector. The software and services industry met the demands of the domestic market and also became a key player in the international arena (Cassiolato et al., 2006). Brazil's IT Software companies, leveraged the partnerships forged during the

liberalisation period, engaged in collaborative initiatives, training programs, and startup incubation efforts to stay competitive and innovative.

The liberalisation policy in Brazil had a transformative impact on the IT landscape, giving rise to a vibrant and globally connected software and service industry that played a crucial role in the country's economic growth and competitiveness. Certainly, the Secondary Innovation Framework and BMI components have played a pivotal role in shaping the trajectory of the IT industry, especially in the context of Brazil, India and Korea. Here's a breakdown of the key components that influenced the industry's growth:

1. **Learning and Technological Capability Building from MNCs:** The foundation of the Indian IT industry's success lay in the learning and technological capability building gained from multinational corporations (MNCs). This process involved acquiring knowledge from mature technologies of MNCs, which served as a starting point for capability building.

2. **Fulfilling Local Customer Needs:** Leveraging the knowledge acquired from MNCs, Indian and Brazil IT companies focused on fulfilling local customer needs. This customer-centric approach allowed them to tailor their services to the specific requirements of the local market.

3. **Network Ecosystem and Software Technology Parks:** The establishment of a robust network ecosystem, along with software technology parks, provided essential infrastructure for software development. These environments fostered collaboration, innovation, and the growth of the IT sector.

4. **Offshoring for Access to Emerging Technology:** Offshoring software development services, particularly to locations like Silicon Valley, enabled India to gain access to emerging technologies and top talent. This strategy aligned with using emerging technologies to advance the capabilities of the industry.

5. **BMI:** Local IT companies seized market opportunities and leveraged new technologies and new partnership to innovate their business models. This adaptability and innovation were crucial for the industry's advancement and sustained growth.

6. **Government Policies:** The support of government policies played a significant role in facilitating the growth of the IT industry. Policies encouraging collaboration, offshoring, and manufacturing by MNC branches in India contributed to the industry's success. As well as technology transfer in Korean IT companies that led to the success of IT strategy set out by Korean government. With the Brazil liberation policy that gave birth to the Software and service industry

In essence, the synergy of these components within the Secondary Innovation Framework with BMI as a critical innovation component created a favourable environment for the IT industry to thrive, learn, innovate, and become a global leader in the field.

2.8 Summary

The dynamic secondary innovation framework presents latecomer firms with a defined process of how to stay in the technology advancement process by taking advantage of paradigm shifts, and learning from these trajectories until such time that the firms have built solid innovation capabilities and can take advantage of emerging technologies to leapfrog to the technological frontier. It lays the foundation of learning and capacity development.

African countries can learn from China, Korea and India while taking into consideration their countries unique constructs and market environment. Cisse (2018) believes that AI, which is a 4IR digital technology, offers an opportunity to impact lives and improve their standard of living in a sustainable manner without continuing to widen the divide amongst the economies. For example, the South African government departments have a mandate to consume IT services within the borders of South Africa to promote economic development. They also use the data sovereignty policy to restrict MNC to sell services delivered outside the borders of South Africa as that will mean data will leave the country’s borders. As a result, those MNCs that have heavy investments in delivery centres in places like India and Spain fail to meet these requirements and rather focus on private sector customers with more flexible policies. This opens an

opportunity for local firms to develop products and services that will meet these requirements.

Both latecomers and incumbents can co-exist, as they are likely to focus on different market segments. The framework allows latecomers to focus on niche markets that are excluded by MNCs as they turn to replicate technology that has worked in developed countries with the expectation of it working in developing countries without customising it.

2.9 Conceptual Framework

The above literature review on the scholarly study done by Wu, Ma, & Xu (2009);Wu, Ma, Shi, et al. (2009); Wu & Zhang (2010) ; Wu et al. (2019) and Kim (1980, 1997) highlights that firms in industrialising countries can use technology from pioneers as a market entry strategy, and then combine the technology with local market knowledge to produce disruptive technologies. IT companies in India and Korea have demonstrated how the secondary innovation framework was applied in the IT industry (Mathur, 2006; Sung, 2009). In the case of South African IT industries, the latecomer firms can use multinational partnerships that currently exist to give multinationals legitimacy in South Africa and technological paradigms such as the Fourth Industrial Revolution (4IR) to enter the South African IT market while building technological capabilities. The review has led to the development of the conceptual framework below. The latecomer companies can then use their knowledge of the market and combine it with disruptive innovation to produce endogenous innovation that addresses societal challenges at a palatable price point to achieve sustainability. The South African

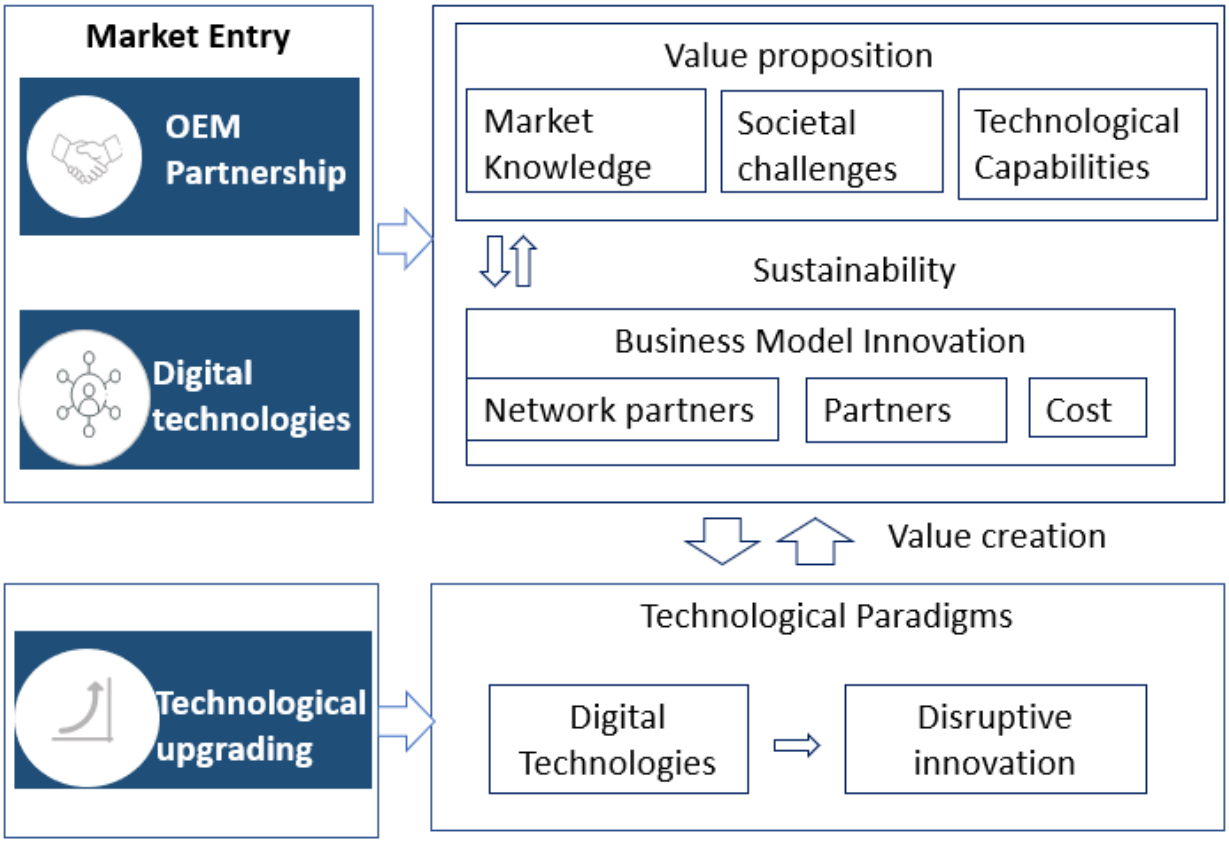


Figure 4: Conceptual framework for producing endogenous secondary innovation and achieving sustainable economic growth.

Kaplinsky & Kraemer-Mbula (2022) argue that the diffusion of digital technologies has led to the emergence of SMEs. These SMEs identify a gap and serve the local market; they grow into formalised and mature companies that operate across the country/region (Kaplinsky & Kraemer-Mbula, 2022). *Figure 4* highlights the key themes from the literature review and suggests that latecomer IT companies can use OEM partnerships with MNCs, technological transfer, cost of services, digital technologies as market entry strategies to deliver technology innovation and services targeted at addressing local challenges. IT companies in India and Korea utilised BMI to capitalise on market changes and meet customer demands. They created services that aligned with customer requirements, leveraging the partner ecosystem and cost considerations to achieve a competitive advantage. As already highlighted in Chapter 1 Mhlanga (2022) believes that digital technologies such as AI are at the centre of alleviating poverty using

big data to improve farming initiatives. According to South Africa ICT-Centric Innovation Ecosystem Snapshot Version 1.1 for Comment (2018) South Africa has recognised the importance for a more robust promotion of digital technologies in business. This acknowledgment stems from a growing awareness of the pivotal role played by Information and Communication Technologies (ICT) in fostering inclusive economic growth. There is an opportunity to assess and refine policies and programs that can foster the establishment of a technology ecosystem, covering the commercialisation of innovation, the cultivation of necessary skills, and the enhancement of public-private partnerships. Realising substantial returns on investment is possible through the development and enhanced distribution of technology absorption capacity, positioning South Africa to lead in the Fourth Industrial Revolution.

Chapter 3: Research Methodology and Design

3.1 Introduction

The framework that was used to conduct the research is grounded by understanding of the theories that emerge from the research project creating an awareness of a reality that exists out there. A research paradigm is regarded by Kivunja & Kuyin (2017) as a philosophical way of thinking based on a belief system that influences the researcher's interpretation. In this research paper the researcher used the epistemological element to reveal what is known and how well that knowledge is known. Sławecki (2018) refers to epistemology as "the theory of knowledge" and knowledge as a process of making conclusions based on social experiences. While Rehman & Alharthi (2016) refers to epistemology as a process of obtaining knowledge, validating, and analysing it.

This study used the interpretivist paradigm to interpret the meaning of the data collected from the participants in a subjective manner and understand their perspective in relation to the phenomenon being studied, as suggested by Kivunja & Kuyini (2017), which is aligned to Slawecki (2018)'s view of understanding and interpreting the reality of the actors based on their daily activities. The perspective of an interpretivist paradigm is independent of the observer's viewpoint. This paradigm takes into consideration the context and facts solicited from the sources to better understand and interpret the findings of the study. As such the interpretivist paradigm will be applied to understand the process followed by the South African IT firms that have emerged post-apartheid to take advantage of globalisation and the opportunities presented by technological paradigms to provide IT services to the South African domestic market first and possibly to other global countries.

3.2 Research Strategy and design

Yin (2018) suggest that case study design is an account of empirical data based on real life situations, as such this study was conducted among existing IT Firms in South Africa to obtain the empirical data using a case study design. According to Yin (2018) by

using a case study research strategy it better grounds the theory and the study becomes generalisable to similar contexts and the findings are even more accurate when multiple case studies are used. Wu et al. (2010) further argue that multiple case studies provide clarity and generalisation of the emerging theory as they are grounded on empirical evidence from various cases, as opposed to just one case study.

Evidence was collected to answer the research question revealing how South African IT firms have built technological capabilities from OEM reseller programmes and technology acquired from foreign countries to produce endogenous innovation. It is key to understand the learnings that were derived from the MNC's partner reseller programmes and technology acquired from these OEMs.

3.2.1 Sampling Strategy

The study adopted a purposive sampling strategy which allows for the selection of participants that will be able to share their in-depth knowledge and understanding of how their organisations were formed, the evolution of those companies, and performance in the market (Rossman & Rallis, 2017). It is key to ascertain the growth patterns and how the companies managed to sustain their existence including the technological learning strategies followed. According to Wu, Ma, Shi, et al. (2009) it is key to take into consideration the local technological environment as that informs the success of the acquired technology and the customisation required by the latecomer company to adapt the technology to the local market conditions. For example, can fast internet technology work in rural areas that still rely on fixed broadband? How are these local technological dynamics taken into consideration?

This research adopts a multiple case study approach using purposive sampling to examine the market entry, learning, and growth strategies employed by South African IT companies. The objective is to understand how these strategies contribute to the improvement or development of endogenous products and processes within the context of the South African IT sector. Two South African companies formed part of the case study, one large IT company and one small & medium enterprise based in Gauteng. The executives, managing directors and divisional heads were interviewed. The study

also included one industry expert who was interviewed. Semi-structured interviews were conducted with owners, CEOs, managing directors of the subsidiaries and senior managers of companies to ascertain the advancement, capability building, and the business model employed to sustain the companies.

The scope was narrowed to IT companies from Gauteng Province. Even though some companies might have a footprint in other provinces, their head office is in Gauteng where the executives are based with easy access to them. The proximity allowed for the researcher to build relations with the participants and the ability to access the participants for further clarity and to confirm the accuracy of their responses and emerging findings.

3.2.2 Data Collection instruments

Since qualitative research is about human social science as per Rossman & Rallis (2017), it is a more interactive way of working with people while observing and listening to them talk about their day-to-day tasks and analysing documents. Therefore, to meet the research quality factors such as validity and enhanced credibility, multiple sources of data collection will be employed. Semi-structured interviews were conducted with executives and managing directors of the selected IT companies. In their book, Rossman & Rallis (2017) highlight that open-ended questions are key in encouraging the development of key observations which are more descriptive in nature about the phenomenon.

A combination of Chief executive officers and managing directors (MDs) from the two companies were interviewed. The interview candidates were nine males. The intention was to interview executives or senior managers that have been in the company since inception, for the two companies. The selected participants were the CEO of company 1, MDs of the operating companies within company 1. CEO of Company 2 and one industry expert. In total, nine participants were interviewed. Seven from company 1, 1 participant from company 2 and an industry expert. During the interview process the participants were also asked about the network partnership ecosystem that the companies leverage to deliver value to the customers.

The interview process allows for probing of more information from the participants than just taking the first answer provided by the participants. In doing, so the researcher was able to capture very critical data about the South African IT firms and might result in knowledge that will contribute to the South African IT industry, as well as the body of knowledge and academic literature. The knowledge obtained from this study will contribute to addressing real-world questions. To ensure robustness and support for the data acquired through the interview process, secondary data from company websites and storyboards displayed on the company walls was utilised for verification and additional context.

3.2.2.1 Participants selection process

In the interview process, the CEO of Company 1 chose three Managing Directors from different operating companies within the group, and one of the Managing Directors extended invitations to three General Managers within his company. Notably, all participants happened to be males by coincidence. In Company 2, a Small IT company, the CEO (also the founder) was the sole participant in the interview process, managing the company independently. The CEO of Company 1, who is also male, participated in the interviews. Furthermore, the industry expert selected for the interview process, based on experience, extensive involvement in various IT companies, and notable contributions to the IT industry, was also male.

3.2.3 Interview process

During the interview, I first introduced myself as well as the project in detail to the participant. The participants introduced and shared a bit more information about themselves to create rapport. The interview questions consisted of general questions about the company and its performance as well as specific questions of how the company is advancing, with a focus on technological capabilities the company has built, including the challenges experienced, growth and revenue achieved. Some questions were focused on the partner network the company operates in, as well as the value the customers derive out of products and services delivered by the company.

A list of open-ended questions was drafted prior to the interviews to guide the data sourcing process. Follow-up questions were asked to obtain clarity from the interviewee following a response to a question asked. Follow up questions gives the researcher an opportunity to get further clarity and details from the participants in a conversational manner as suggested by (Rossman & Rallis, 2017). The follow-up questions were formulated during the interview process. Not only do follow-up questions provide further details to the researcher, but they also present the participant with an opportunity to deepen their experience (Rossman & Rallis, 2017).

Before recording the interview, permission was obtained from the participants. Handwritten notes were taken during the interview, with Interview records created in a form of interview transcripts as well as recordings at the end of every interview. The data was arranged in a systematic manner for easy access. The authors Rossman and Rallis (2017) recommend that when a researcher claims to know? something post a study, there must be data to support the claim.

3.2.4 Secondary data sources

Wu et al. (2019) advise that by searching secondary documentary sources help to intensify the understanding of the phenomenon. Lastly, field observations play a key role in gaining insights around the behaviour and the processes involved in the day-to-day activities that result in technological capability building by participating companies. This process of using multiple data collection sources results in the triangulation approach of data collection to further improve the reliability and confidence of the findings. The aim is to gather sufficiently convincing data to draw a conclusion about the phenomena. In Rossman & Rallis (2017)'s view, by using multiple data collection strategies, it enhances the rigor and credibility of the study. An industry expert was interviewed as a secondary source of data, as well as some data from the company websites.

3.3 Data Analysis

The process of analysing the captured data is a very involved process. To better understand the thoughts and experiences of the participants from the collected data sources, the thematic analysis technique was used. ~~(2020).~~ Kiger & Varpio (2020) propose that the thematic analysis technique is a powerful and appropriate method for analysing qualitative data in epistemological frameworks. Thematic analysis involves identifying, analysing, and reporting patterns (themes) within the data, making it a valuable approach for interpreting qualitative information within specific epistemological contexts. This technique of analysis is a chosen method as it presents the ability to identify, organise data according to themes that emerge in a systematic manner according to Braun & Clarke (2012). Emerging common topics and themes in relation to the phenomenon will provide answers to the questions in the study.

Data analysis will follow the 6-step process (Braun & Clarke, 2012).

- Phase 1: Familiarising Yourself with the Data
- Phase 2: Generating Initial Codes
- Phase 3: Searching for themes.
- Phase 4: Reviewing potential themes.
- Phase 5: Defining and Naming Themes
- Phase 6: Producing the Report”

Data analysis is not confined to the conclusion of data collection; rather, it is intricately interwoven with the entire research process. This includes the formulation of research questions, the data capturing process, as well as the documentation of notes. The analytical journey commences from the initial stages, influencing the way data is framed, collected, and recorded throughout the research endeavour. The end report is a convincing story based on the analysis of the data collected. As such, it must make arguable answers to the hypothesis of how South African IT firms have built technological capabilities from the OEM reseller programmes and technology acquired from foreign countries for it to add value to the academic literature (Braun & Clarke, 2012).

3.4 Ethical Considerations

The study adheres to the ethical principles as documented in the Wits policy by ensuring all interview recordings and data collected are stored in a prescribed manner by the ethics committee. The identity of the participants is kept anonymous and will be referred to as participants 1, 2, 3... As a Researcher I have adhered to ethical guidelines and procedures. Prior to the data collection the participants first agreed to participate in the study. The data collected will not be manipulated and the findings will be deemed valid and reliable with supporting evidence.

3.5 Reliability and Validity

Table 2: Validity and reliability of the study

Test	***Comments***
1 Construct validity	The study will consist of multiple sources of data as evidence which will be analysed to inform the answers to the questions asked
2 Internal validity	The test for internal validity will be performed post the data collection to access the underlying relationship between the variables and whether the themes that emerge from the findings are congruent
3 External validity	From a validity point of view the findings of the study can be generalised to other IT companies within South Africa and might also apply to sub-Saharan Africa. However, it cannot be generalised to other industries within South Africa. The IT industry has very different cycles and OEM and MNC partnership models.
4 Reliability	In case study design, data collected comes from credible sources who are knowledgeable based on their experience and beliefs, thereby rendering the

	data authoritative and reliable. Since this study will source data from credible sources that renders the study valid.

Chapter 4: Presentation of data

4.1 Introduction

The presentation of collected data during the study from participants in Company 1, Company 2 and the industry expert. The research study was focused on answering the following questions:

- What have the South African IT companies learned from the foreign technology acquired from MNC's to develop secondary innovation that meets local customer demands?
- How do local IT companies take advantage of digital technologies to develop and gain market entry using disruptive innovation?
- How might local IT companies reach original innovation in the South African IT industry and become more globally competitive?

The data is represented in a table format with some of the questions and verbatim answers provided by the participants.

4.2 Profile of Participants

Nine (9) interviews were conducted consisting of the follow's participants: from Company 1: Chief Executive officer, three (3) Managing Directors (MD) three (3) general managers. From Company 2: one (1) founder and director of the company and one (1) IT industry expert.

Table 3: Company comparison

Attributes	**Company 1**	**Company 2**
Number of employees	5500	13
Head office	Johannesburg	Johannesburg

Revenue	5.3 billion	9m (22/23 financial year)
Number of OEM Partnerships	Over 5	1
Number of participants	7	1
Services Offered	Technology solution provider	Design and Development of Digital Products
Years of existence	58	7 Years
Footprint	South Africa, the Middle East and Australia.	South Africa

4.2.1 Brief introduction of Company 1

Company 1 is an IT system integrator company based in Gauteng. The company consists of multiple operating companies providing various IT solutions and services. The solution and service offering range from homegrown and customised solutions to partnering with Multinationals. The company has been in existence for over 50 years, and it employs over five thousand employees as highlighted in *Table 3.* It is a multibillion company listed on the Johannesburg Stock Exchange with a revenue of about 9 billion rands according to the CEO of the company. The company has segmented its operations into customer segments and/or solution and service offerings per customer segment. It consists of several operating companies and only three managing directors of operating companies, plus the CEO were interviewed as part of the study. Three general managers from the one operating company joined the interview, however they will be counted as one participant representing participant 3.

4.2.1.1 Participants from Company 1

Table 4: Profile of participants from Company 1

No	Code	Role	Work experience
1	Co1Part 1	Chief executive officer	23 years
2	Co1Part 2	Managing Director	35 years
3	Co1Part 3	Managing Director	29 years
		General Manager	15 years
		General Manager	15 years
		General Manager	15 years
4	Co1Part 4	Managing Director	17 Years

The general managers formed part of the interview with Co1Part3 as presented in *Table 4.* They represented the views of the Managing director as the MD could not stay for the duration of the interview. As such, they will be considered and counted as Co1Part3 and not individual participants.

4.2.2 Brief introductory of Company 2

Company 2 is a small start-up IT company based in Gauteng. The company was formed in 2016 and currently employs about 13 people. It develops custom IT solutions using digital technologies to address unique customer challenges.

4.2.2.1 Participants from Company 2

Table 5: Profile of participants from Company 2

No	Code	Role	Work experience

1	Co2Parti 1	Director and founder	7 Years

4.2.3 Brief introduction of the industry expert

He is a corporate executive who held various top executive positions in both multinationals and local IT companies. He has achieved exceptional results in his previous roles, recognition, and industry awards. He continues to play a critical role in the South African economy by leading and providing transformational advice to various South African companies.

4.2.3.1 The IT industry expert

Table 6: Profile of the industry expert

No	**Code**	**Role**	**Years of experience in the role**
1	ID 1	Former CEO of local IT companies and multinationals	Over 25 years

4.3 Presentation of results

The results of the study are presented based on the literature review categories, that enable latecomer firms in industrialising countries to achieve technological upgrading. The categories, which are market entry strategy, value proposition, value creation, and BMI are critical in the success of companies.

4.3.1 Market entry strategy

The participants were asked to share the market entry strategy used by their companies for? the IT market. According to the literature, latecomer companies from countries with limited resources and R&D facilities can source mature technology from pioneers as a quicker way of entering a technology industry without the trial-and-error process that the pioneers have already undergone. Latecomer firms get to benefit from "free rider effects and the lessons from the pioneering companies, while reducing R&D investment costs and market entry costs", as noted by (Wu et al., 2010; Kothari et al., 2013). The following responses were captured from the participants in company 1.

Responses from Company 1 participants

Co1Part 1: "This is a 57-year-old company, South African founded, that stood the test of time. The owner was an engineer with an entrepreneurial flair. Driven by the skillset and the vision of the founder. Identified a gap in the market. For The impact of the business network effect of the company in the economy of 5500 people it employs. As the company they enable any other companies to succeed and grow".

Co1Part 2: "The founder recognised the gap and came up with technologies and solutions to address the gap in market. Innovation came naturally to the family that started the business. The company is over 50 years old and came up with technology solutions that solves problems in the health care industry. World class solutions were built based on studies of what is happening globally. Now we can export the innovation into first world countries and not just African countries".

Co1Part 3: "There was a gap in the market for a credit management solution especially in the unsecure lending market segment based on a platform that could collect and enable payments for the collections of unsecured loans of the customers. Gap for a need for a bank agnostic service provider that could provide debit and credit card payment terminals either to rent or for sale to merchants. And to also provide payment

transactions on behalf of those merchants. That was the gap identified and led to this business".

Co1Part 4: "Both businesses are systems integrators for OEM products. Why do they exist, it's all because a customer needs end to end IT solutions from infrastructure, network, PCs. The ability to provide a multiple service as well as support it. We can implement off the shelf solutions such as Microsoft dynamics, ERP solutions, that create an opportunity for customers to transact. We also build custom solutions for customers that cater for their go to market. We developed a call centre platform and managed that platform for a customer. We can bring together multiple platforms and ensure they can work together".

Response from Company 2

Co2Part1: "The idea is to build products using 4th industrial revolution technologies such as AI and machine learning, wanted it to be organic growth. I entered the market by doing consulting work first."

Market entry as perceived by the industry expert.

According to the industry expert, latecomer companies from industrialising countries do not have to reinvent the wheel. They can use the technologies from the global North to enter the market and add value to the local market. The verbatim response from the industry expert ID1 below reflects this view:

ID1: "The easiest way is becoming a partner as a reseller. This adds very little value, or become a system integrator, which is a complex way of doing things. The other option is become a solution provider such as a Microsoft partner, which uses the Microsoft platform to develop their own solution. Last one is companies that use their own IT intellectual property and add it to the technology sourced from the global North. There are very little of those".

The responses summarised below:

Table 7: Summary of Market entry strategy responses

Market entry strategy			
Participants from Company 1	Building technology from the ground up to address local challenges	Partnership with OEM	Through consulting work
Company1			
Co1Part 1	X	X	
Co1Part 2	X		
Co1Part 3		X	
Co1Part 4		X	
Company 2			
Co2Part 1	X		X
Industry expert			
		X	

From the data collected above, it is quite clear that the OEM partnerships presented by multinationals are a preferred market entry strategy. However, the data also shows that the up-and-**coming start-ups with** less overheads and more risk appetite are using the disruptive technologies to enter the market as presented in *Table 7*. Wu et al. (2010) and Baden-Fuller & Haefliger (2013; Banda et al., 2022; Christensen et al., 2002; Teece, 2010; Utterback & Acee, 2005) also advise that latecomer firms can create value using disruptive technologies while creating a competitive advantage in their domestic market.

4.3.2 Value proposition

Companies in industrialising countries can derive value from the imported technology by first learning from the technology during the assimilation phase of the secondary innovation model, above creating knowledge in a form of technological capability. The three areas of value proposition are: Market knowledge, societal challenges, and technological capabilities. Below are some of the verbatim responses to questions asked in relation to value proposition that the two companies use to differentiate themselves in the market.

Co1Part 1: "We focus on unique and industry leading capability in certain growth segments in the market. The biggest partnerships in the country with a network vendor. The company identifies market opportunity, which leads to differentiated service offering by, using emerging technology to lead in the market. Market opportunity critical communication, non-GSM networks, which are regulated, and they cannot go down when GSM goes down. Regulations also create market opportunity".

C01Part 2: "We differentiate ourselves by reading and understanding trends in the industry and translate it to what is locally relevant. Economically SA is going through a tough time, and the growth of the country is slow, so by introducing expensive solutions, it will not support the industry and succeed. Must understand what is happening in the local context. We must be customer obsessed, have a fully-fledged customer experience team and call centre, with support centre and we have fully-fledged training centres throughout the country. We make sure that whatever we do makes the Dr's practice sustainable, if a practice goes bankrupt then the business loses a customer. We bring in innovative thinking, thought leadership to make the Dr more relevant to their patients, which translates to a sustainable business. Use technology to make sure that the Dr offers exceptional service to patient. Looks at the patient's needs, looks at the ecosystem and makes the patient experience the best one so the Dr can pay for the services we offer. Make clients profitable and financially stable by developing solutions that support their practice. There is a huge value add. Three types of customers,

practice customers, Dr's physiotherapists, etc., corporate clients and medical aid providers [health insurance companies]. We process over 100 million a year of medical claims. We make sure that the technology works and is available all the time. We do the basics right".

Co1Part 3: "consume the original technology from OEMs, then build the intellectual property that will either work inside or adjacent the product/technology to provide the service that we do provide to our customer. Not enhancing the physical product, but rather the software enhancement of how the product is integrated into the end solutions. There is heavy reliance on the OEM to keep on with the R&D because they are global companies with the necessary budget, we benefit from the development and additional functionality from the products, enhancement of the aspects to innovate, and make the product suitable for the market. We use the Microsoft stack to develop our intellectual products, we are a consumer of the Microsoft products, and we have 50 odd people that can develop. We develop the applications that run those payment devices and that is the IP developed from our organisation. That is what we rent to our customers. It's not device selling but using the device to add more functionality and innovation to service the customer base".

Co1Part 4: "The differentiation is with our people, we pride ourselves with the quality of the people we have on board, they are exceptionally trained, and customer obsessed. It starts with managing the customer experience, and the ability to automate a lot of tasks with our customers, which gives us a cost competitive advantage. We offer a one stop shop for our customers, as we can provide capability across the entire value chain. Clients do not need to go multiple service providers to provide them with IT solutions".

Below is the verbatim response from Company 2 in response to value proposition questions:

The responses from Company 2 are summarised below:

Co2Part1: "We build services from bottom up, that are specific to the customer problems. With quality and the broad extent of the solution, we not selling a product and

customising the solution for the client. We build solutions from scratch especially what does not exist. It's not about cool tech, the question is does it make sense to the clients, is it operationally feasible and offer business improvement? The level of skills, expertise in machine learning, engaging with it and not on a theoretical aspect. In South Africa, technology such as AI and machine learning is normally overlooked, the focus is on cloud. We take customers on a journey; we start small and grow it into something bigger. Not just presentations, real solutions. It's a passion, I specialised in it in my thesis".

The responses from the case studies summarised below:

Table 8: Summary of value proposition responses

Value proposition				
Participants	Understanding what is happening in the local context	Industry leading capabilities	Use technology to innovate	Customer obsessed
Company 1				
Co1Part 1	X	X	X	
Co1Part 2	X	X	X	X
Co1Part 3	X	X	X	X
Co1Part 4	X	X		X
Company 2				

Co2Part 1	X	X	X	X

Company 1 identified market opportunity and matched the opportunity against existing technology in the world to service and meet the local market demands as presented in *Table* 8.

The participants were asked to comment on the process their operating companies use to develop new products and services offered to the South African market. The participants offered varying responses. However, the data seems to suggest that the operating companies in Case study 1 develop new solutions and services based on customer requirements. The demand for technology by customers stimulates technological capabilities to improve or develop endogenous technology as per (Kim, 1997) and (Wu, Ma, Shi, et al., 2009). Requirements are gathered from the customers, and this creates the demand for improvement or enhancements of the sourced technology to meet customer requirements. Some of the verbatim responses from the participants are detailed below:

Co1Parti2: "internally, we look at the market segment and identifying uses cases that we want to solve for. Using various use cases, as well as a funnel of requests that come from the customers. If there are shortcomings from OEM, it is very difficult to get the OEM to fix those issues. If there is a request from a larger customer base, say top 10, there is interaction between the business analysis and the customers to determine the specific requirements. The product is then built specifically for those customers. There is also a priority decision for other functionality where we take a request and determine how many customers are interested in that new specific functionality request. Based on the findings, the request will then make it to the funnel. The development of the product is then done independently of the customer interaction and gets released into the market".

Co1Part3: "Products and solutions that we provide are not cookie cut solutions, they are bespoke per customer based on their requirement, depending on price and service level requirement and product requirement. Some customers require a touch and feel service with resources based onsite to cocreate with them which other customers might require a quick and dirty solution".

The response from Company 2 regarding development of products and services

Co2Part1: "We get leads from existing partners who get requirements from their customers, due to lack of skills and expertise they approach us to assist with the development of the solution. Mostly, the consulting firms come with business requirements as part of a project, and we work with them to develop solutions for the project. We also rely on word of mouth based on previous work done with existing customers. In some instances, we are doing work in the retail world which looks at spending habits and that uses machine learning and AI. We then recommend a solution from that analysis of spending. We are also doing some work in the energy space, especially with the current loadshedding challenges. We look at when do you use your appliances and how much power do they use to preserve power on the power backup devices. For example, with solar, at any given point in time that solution is powering the house as well as the powering battery. There is an optimum solution that advises the consumers on which power source to use."

The industry expert's view is that before local companies invest their time and effort to develop new products and service for the local market, they should first do a market analysis and identify challenges to solve for. Below is the verbatim response:

ID 1: "they first look from outside in and identify a particular challenge they see and experience on a day-to-day basis. The next step is to approach the customer and verify the challenge, to jointly develop the solution. If a solution is developed without the involvement of the client, it might lead to the customer not buying it. By collaborating

with the customer means getting buy-in so when the product is ready for consumption the customer will then buy into it and consume it."

Based on the data collected and analysed, it appears that local IT companies focus on producing products and services tailored to address domestic challenges. These products are designed with the specific aim of solving customer challenges within the local context. According to Cassiolato et al. (2006; Mathur, 2006; Wu et al., 2006). customer requirements are also highlighted as key source for product development. User requirements are what drive local companies to improve expand their product offerings to meet these demands because of functional understanding of the imported technology.

4.3.3 Organisational learning and Technological capability building

Technological capability is at the centre of developing products or improving existing technology to meet the domestic requirements. It is therefore key to assess how local IT companies develop the necessary skills and knowledge to produce products and services that sustain them and enable the companies to produce endogenous innovation. When asked how the companies develop and source the technical, business skills and expertise to successfully develop and produce products, these were some of the responses captured:

Responses from Company 1

Co1Part2: "Graduates programmes that bring in talent (raw talent) at the foundational level, we invest in training to get the students to work on innovative stuff. The stability of the business attracts talents, the brand is seen in the market to do exciting stuff which attracts talent. We also use social media to promote the brand to attract talent. Make impact to the society, people are attracted to a success story. Expose the skills to the latest technology, retrain by investing in their development plan, people have a career growth and that is not static. Strict performance appraisal system, find areas that people can flourish in. Ensure that the staff stay engaged by management, vision, platforms for generating ideas, shout out and acknowledging key contributors, respecting, and empowering. We make sure that the people feel their ideas and effort matters. We

empower them to take control, we pay market- related [competitive] salaries. Skills are scarce in SA, there is skills shortage, with people leaving the country. We make sure the people are excited about their jobs and look forward to going to work in the morning. More effort is made into this aspect."

Co1Part3:" There is about 50 plus people that develop the IP we add to this equipment. There is a war for talent, few pipelines are used. Use a learnership to source people from internal or other financial partners. The candidates are presented with an opportunity to learn and show capacity then they sometimes get absorbed into the company. Junior developers with knowledge we use them in projects and not service aspect, we require two years' experience and give them two years period before they get absorbed into the business. Mid to senior appointments are done by the talent sourcing through human capital who go to market and look for suitable resources. We try to accelerate the career of internal people rather than source externally. There is a training path for each stream, to build proficiency. Back office works a lot on database proficiency and get them to a mastery level. Understanding the Customer requirements, social and climate requirements to build the competencies through training.

Co1Part4: We are obsessed about training and certification. The OEM business and referrals we get, is all because we are certified to the highest level in the latest technology and products to deliver quality service to customers. The country is faced with [a] skills shortage with lack of people that could service the requirements of customers. We therefore have a graduate development program with 90% absorption rate. The graduate program is purpose driven.

Responses from Company 2

Co2Part1: "We have a budget for training and upskilling to upskill and keep up with how quickly things are changing. Recruitment process needs to be designed from scratch. There is a test design to follow. A rubric to follow and based on the output, they can recommend the right learning using the current learning platform.".

Table 9: Summary of capability and skills development responses

Capability and skills development				
Participants	Graduate program	Training and certification	Talent sourcing	On the job learning
Company 1				
Co1Part 2	X	X	X	X
Co1Part 3	X	X	X	X
Co1Part 4	X	X		
Company 2				
Co2Part 1		X	X	X

The data collected reveals in *Table 9* that Company 1 has invested in a graduate program as well as a deliberate training program for their employees in the different operating companies. Company 2 on the other hand has also invested in a training budget for their employees. Taking the size of the companies, it makes sense that Company 2 has no graduate program.

The research investigated the differentiation between multinationals and local domestic companies. The participants were asked how they stay relevant and successful in an industry that is dominated by multinationals and some of the responses captured indicate how understanding the local market plays a critical role in? differentiation.

Responses from Company 1

Co1Part2: "Not happy with staying relevant. In other operating companies there is [an] R&D budget, however there is no company R&D budget and practice. There is no innovation process company wide. There is however investment in the leadership development and technologies training".

Co1Part2: "Our competitors in this space are new entrants, as they are on the technology curve, they compete on technology advancement, while we have legacy technology. We have strategies to modernise and make sure we are relevant in the market, otherwise we will get stale and die. We can develop and fund the development much easier. There is no initial development, and the new entrants have no budget for R&D, while a big and sustainable company such as this can develop and spin off profit to R&D, which then produces new solution funded by existing products."

Co1Part3: "We always buy the devices from the source. On the switching side, it's quite complex and compliance intensive, must be complaint, and make sure the technology is the best of breed. With the base technology we can then differentiate by products at scale. We can aggregate the customers if there is credit management or loan providers that want to integrate into a specific retailer. The multinationals do not understand our customers' socio-economic environment and political climate at a given point in time. ~~at a time~~. Compliance might take them longer to get right. The disadvantage is they [MNCs] try and compete in rands vs dollars, local companies can offer the service in rands, no [without] price differentiation it makes it difficult to complete. SA is a small market and they [MNCs] do not want to review their price to match the market rand dollar value."

Co1Part4: "The difference is that local companies find it easy to do business with us as compared to multinationals. The customer experience is frictionless. The quality of the people across the board to engage with customers are at a different level, experienced and knowledgeable. Some of the multinationals get things right because of scale and can take on big projects. There is a bias in the market towards multinationals that they can take on bigger projects."

Responses from Company 2

Co2Part1: "Big companies are struggling to solve the small problems, for example SAP enterprise system is good for big multinational and big companies like Shoprite, we solve specific problems for what customers need at that [given] time. Have a product that solves a spectrum of company's problems. Big companies are not innovative enough."

The industry expert's response is aligned to that of the two companies.

ID 1: The only way is customising their service to the local market and make it relevant by addressing the local challenges. They start with a local problem, trying to digitise the filling of returns, they develop a product that addresses the local problem. They come up with a unique proposition and solution. Can customise the solution because they understand the local market. Multinationals develop generic technology that works everywhere however it might not necessarily address the local challenges. Local IT companies have an opportunity to build on the existing technology and derive more value from it.

4.3.4 Business model innovation

The focus of BMI was on the process domestic companies undergo? to derive a price point that is palatable to the local customers, as well as other aspects that make the development of a business innovation model to derive sustainable growth and value. According to Codini et al. (2023; Mehrotra & Velamuri, 2021; Wu et al., 2010)latecomer companies from industrialising countries with disadvantaged technological capabilities can capture value by introducing mature imported technology in their local market using a secondary BMI. They capture value by offering products and services that are simpler, affordable, and easily usable by their domestic customers to achieve sustainability. The scholars further advise that latecomers' firms can do so by leveraging their partner networks. So, the three key levers for suitability that latecomer firms can use to create value from imported countries is BMI, cost, and network partnerships.

4.3.5 Solution Commercialisation

The participants were asked how they price their products and service to meet the local market, below are the responses from Company 1:

Co1Part2: "… launch new products all the time and must figure out the price. Products go through [a] pilot phase whereby we test the technology, capability as well as the pricing. We have a program with customers who participate in the pilot project and test the price. The pilot participants give feedback input with regards to value and the price

tag. This helps to define a price tag that is affordable to the customers and adoption of the solution when it hits the market. The sales team also understands the market and provides feedback."

Co1Part3: "We understand the customer requirements, the value provided helps define the pricing. We first understand the input cost, the value attached to the products then we derive the cost. We use partners to resell the products, as white labels, and they can sell these devices independently. Our business prices the devices for reselling. Being in the market for long means we understand the entry cost. It's a continuous cycle of improvement, simplifying complexity. As a result, we keep the pricing model simple. No one price fits all. We provide solutions, and not widgets. It's a collaboration between the resellers and the customers. We must understand the customers. The customers must make money for the business to also make money."

Co1Part4: "Price points are never palatable to clients. Pricing around people due to skills scarcity is not where we should be, probably over inflated. Due to high demand of certain skill set, customers are willing to spend money on the service. The engagement with customers is centred around what the customer wants to achieve and therefore they are willing to pay for a service that is outcome based. Post implementation, there is a continuous improvement process to check if the solution has achieved the expected outcome. If you deliver vanity to the customers, it is difficult to articulate the value."

Responses from Company 2

Co2Part1: "Pricing is more [dependent?] on time and material, based on the resources that are required. Priced on the cost to the consulting firm or partner and they add margin to it. The challenge is what is the market related price. In this industry there is no salary scale and range for the resources with cutting edge technology skills. If hiring a resource and they are coming from another job, can we match or beat the current salary if they are currently employed?"

Response from the industry expert

The industry expert also shares his view on how the local IT companies should price their products and services such that they are affordable by the local customers. His view is that:

ID1: "By offering commodity services at the bottom of the pyramid there is no price differentiation, The price is determined by the market. You cannot reduce the price, however that eats into the profit margin. This applies to resellers, companies that remain resellers. As companies go up the value chain the pricing by adding innovation to the primary technology sourced from OEM, then they can change the pricing as the service has added value, they can charge for the additional value."

Table 10: Summary responses for BMI - solution Commercialisation

Business model innovation – Solution Commercialisation				
Participants	Collaboration with customers to derive the right price	Understand the customer and the market	Use the value of the product to derive pricing	Pricing based on availability of skills
Company 1				
Co1Part 2	X	X		
Co1Part 3	X	X	X	
Co1Part 4	X	X		X
Company 2				
Co2Part 1		X		X
Industry Expert				

ID1		X	X	

Summary of data in Table *10* highlight that latecomer companies in IT provide technology and services to their local market that are affordable to the domestic market. Understanding the market gives the latecomer firms a competitive advantage compared to the foreign companies. The latecomer firms also benefit from lessons learned of the pioneers of technology, without having to invest heavily in marketing and research activities for new product development. Collaborating with customers and understanding the requirements from customers are key to derive the right price for product and service.

4.3.6 Network Partner Ecosystem

(2010) recommend that latecomer companies must leverage the assets of their strategic partners to formulate a unique network ecosystem within their local environment to capture value from imported technology. The participants from the two case studies were asked about their partner network ecosystem and the roles played by partners to enhance value creation.

Response from Company 2

Co1Part1: "We partner in the traditional reseller mode with OEMs. Our business in some Opco's is built on Microsoft platforms. Products and services are highly regulated to meet the compliance requirements. So, regulators play a critical role."

Co1Part2: "We have created channel partners that support the business in certain practices through financial agreement, the more customers they bring on the more money they make. Some of these businesses have been running and passed on from generation to generation. They allow the company to penetrate the market and operate in other provinces without setting up an office. We are covering the entire country with channel partners. 25 companies in total that we have built and sustain. They sell the products; some bring their ideas and produce new products. The also enable the

business to operate in other areas and provinces where the business has no offices. They also help to define a right price for new products and services. We are constantly evaluating what ecosystem to build and become a dominate player on the ecosystem. We are now creating new ecosystem linked to the allied industry partner with organisations that will help to grow the business into an ecosystem. To get better thinking, flexibility, and speed when it comes developing new innovative solutions, we partner with start-ups that bring new skillset."

Co1Part3: "OEMs are key partners from switching and terminal side, software partners, connectivity partners. Sales and marketing are done internally. There are sales and account management that sell the products. The solutions are complex to sell, it makes the sales cycle with customers longer. We require assistance in supporting the technologies and rely on partners to do that. There are also partners that provide services on the technologies as well as insource developers to do some development work. The big differentiator in Fin Tech is regulations, the products and service are highly regulated which meet the compliance requirements of, NCR, reserve bank, ESP, PCI certification and FICA".

Co1Part4: "OEM, are key partners, in order of value and scale. OEMs didn't want to work with each other in the past, they were ultra-competitive and more and more they are now working with each other, there is cross collaboration, and we facilitate it as systems integrators. We are aggregators across the hyperscalers, we provide advisory capabilities with what is fit for purpose for our customers, against what they are trying to achieve not trying to push the products".

Response from Company 2

Co2Part1: "a. Digital marketing agencies, they have a lot of the leads, get the business and no technical expertise, marketing related, they will provide the URL development. Word of mouth"

The verbatim view from the industry expert about the role of partners in latecomer companies' BMI:

ID 1: "Multinationals are still important partners. Local systems integrator, develop the core technology comes from multinational. They pay license fees for the IP of Microsoft for example. Products and services are built on what is in existence, and not reinvent the wheel, it might take a while for latecomer companies to come up with their own new technology. Global hyperscalers, Microsoft, Google, Amazon, and Alibaba, some have built datacentres in SA which allows us to connect to the cloud, rent a space that has all the infrastructure that is in existence. It has levelled the playing field. This gives them the opportunity and power to run a business in a global environment as cloud can be accessed anywhere. That is powerful, it is encouraged, it is good. In each one of these hyperscale technology they have AI built into them, that means new start-ups can already leverage the technology and skip to the front without re-inventing the wheel. Help the local players to go to the top end, without the pain of being first."

Table 11: Summary of responses for BMI- Partner ecosystem

Business Model innovation – Partner ecosystem				
Participants	OEMs	Resellers, agencies	Regulators	Start-up for skills
Company 1				
Co1Part1	X		X	
Co1Part 2		X		X
Co1Part 3	X		X	X
Co1Part 4	X			
Company 2				
Co2Part 1		X		X
Industry Expert				

ID 1	X			

Partners play an important role in expanding the reach of products, deriving price for products as well as providing scarce technology and skills. Summarised data in *Table 11* reveals that partners help build the necessary technological capabilities that are required by the latecomer firms to improve existing foreign technology to meet domestic demands as well as develop endogenous technology.

4.3.7 Digital technologies and future growth opportunities

The participating companies were asked about their future of using emerging technology to advance their companies to grow and remain relevant. Below is the verbatim response from the participants from the two case study companies:

Co1Part1: "Business needs to transform into more of a telematics, SaaS data driven Internet of things business. Use data analysis, 4IR technologies, to transform and grow the business. One Opco is exploring opportunities for platform ecosystems, it's already building ecosystems and moving away from just software developers, we are partnering with a pharmacy in making decisions on where to build the next pharmacy based on the data we have. Planning to combine the five IT businesses to create a power IT business. Want to partner with another hyperscale and use the existing skills to replatform the applications to run in the cloud at a South African rand rate, this will help with the migration of the clients into the cloud. Some of the applications cannot run in the cloud platform as they are, they need to be replatformed for compatibility".

Co1Part2: "We have gone live with the platform business last year; we want to attract producers onto the platform business to build a bigger ecosystem. Some of our products are highly relevant and we want to take the business into the international market. We want to mature the health care industry and use data analysis to analyse the patient data we currently have to help improve lifestyles of patients. In the new

solutions that we are developing, yes for data analysis. Through one of our partners, we have embedded AI into one of our solutions.".

Co1Part3: "One of the big plans is to introduce android devices with more functionality to enhance the customer experience. The current devices are very static. The replacement of [current] devices to [new] android [devices] with more additional functionality such as interacting with the customer. We are currently having conversations with the customers and figuring [out] what is the solution and further functionality that the end customers would want. It is done in a consultative manner with the customers, it's the next big movement in the industry. There are lot of players in the market now, with lots of offerings and lots of pricing. The current static devices are a grudge payment".

Co1Part4: "Building annuity income, building everything as a service, able to aggregate OEM technology on an on-demand basis, so customers can focus on their core business in an ambient manner? cannot be in your face, it must be something that just works in the background. Sustainability is built on predictable revenue streams with predictable customer experience. We remain relevant by making sure we are up to date with the relevant technologies, based on the outcome we want to derive from using these technologies. [Technology] certification [is obtained] on a yearly basis, linked to the outcome [the company wants to achieve]. Like [the] cloud service is [perceived to be] expensive [making adoption of the technology slow], however when you focus on the benefits [of cloud service] as opposed to the cost associated to the service, [customers are open to cloud adoption which enables the company to sell cloud services aligned to the strategic ambitions]. We must articulate the benefits of cloud as an agility, flexibility, ability to innovate than use existing technology to go to market a lot quicker as opposed to it being about cost. CIO's and customers get caught up in the hype as opposed to what it is that they are trying to achieve. The latest one is ChatGPT, customers want the latest and greatest, it's a vanity thing".

Response from Company 2

Co2Part1: "Want to develop products, that will bring consistent revenue. The future plans involve addressing the energy crisis in South Africa by developing products aimed at providing solutions. The strategic intent is to productise these solutions, transforming them into marketable products or services that resolves a critical issue but also aims to generate consistent revenue through these solutions. The frustration is that there is no uptake for cutting edge technology. Looking at an international clientele, interest for cutting edge technology is with international clients. Planning to open shops in other countries. There is a huge need for IT skills.

Response from industry expert

ID1: "We have challenges all around us. The fact is we are in an emerging market; it means we have lots of challenges. We must look at the problems around us and solve those problems. Only local companies within a context of the local challenges can solve those challenges. There are a lot of challenges experienced by black people that technology can help solve. The people that have solved subscription challenges such as prepaid are white people. Pre-paid is a black problem, the concept is trying to solve the black problem. MPESA with transferring of money solutions, wallet is addressing the black problems".

Table 12: Future growth opportunities and digital technologies

Future growth opportunities			
Participants	Advance to international market	Use digital technologies to advance	Solve local challenges
Company 1			
Co1Part 1		X	X
Co1Part 2	X	X	X
Co1Part 3		X	

Co1Part 4		X	
Company 2			
Co2Part1	X	X	X
Industry expert			
ID 1		X	X

The summarised data presented in *Table 12* highlights that the firms in both case studies have aspirations to use digital technologies to solve local challenges as well as take their products into the rest of Africa as a growth strategy.

4.4 Summary

The data collected from the two case studies paints a picture of how these companies entered the South African IT industry and the purpose for their existence. It also has similarities. The market entry strategy was different for the two companies. Taking into consideration that Company 1 has six operating companies that operate autonomously and of those, only three managing directors of these were interviewed. The three operating companies produce and sell different IT products and services. Three operating companies had different market entry strategies, Operating Company 1 develops solutions from the bottom up, while operating company 2 uses imported technology to develop solutions on top of that technology or adjacent the technology to address to domestic market need. Lastly operating company 3 used the traditional IT reseller programs offered by OEMs to enter the market. Whereas company 2 is a small start-up company focusing on the development of custom IT solutions for their clients using cutting edge technology, Company 2 used partnership with the local IT companies through consulting work or as a skills provider for the cutting-edge technologies such as machine learning.

The two companies used technology from pioneering companies in industrialised countries. The key reason for the existence of these two companies was to meet a

demand in the domestic market Cassiolato et al. (2006; Chesbrough, 2010; Christensen et al., 2002; Wu et al., 2010b; Yi et al., 2022). The founders of the companies identified a gap in the market and decided to fill the gap with suitable solutions. The participant from Company 2 advised that there is a huge focus on cloud and less focus on fourth industrial revolution technologies such as AI and machine learning, and so the company's focus is to meet this gap by developing the AI and machine learning skills that will address challenges in South Africa such as energy issues . Even the industry expert exerts that the prevailing strategies for latecomer firms in industrialising countries is through partnerships or reseller programs with the OEM or multinationals. There are other complex strategies such as being a system integrator and solution provider for the multinationals. According to J. Lee et al. (2019; Vaska et al., 2021) companies can use digital technologies to solve customer problems, therefore Company 2 is focusing on solving local problems using digital technologies through exaptation (Codini et al., 2023).

The participants from Company 1 stressed the point around being customer obsessed by understanding their customers and customer needs as a key aspect of their success and differentiation. The customers' needs go hand in hand with understanding the market demands which allows the company to position themselves as suitable providers of the solutions that the customers are looking for. There is a technology demand pull from customers once they know of products and services delivered by these companies, which triggers the technology improvement process leading to differentiation from multinationals. The industry expert believes that the latecomer companies do not need to differentiate themselves from the multinationals, as the multinationals are looking for partners. Local companies have the opportunity to enhance value in the local market by incorporating various elements. These may include service contracts, setup and installation services, recommendations, and customisation. The ability to provide these additional services contributes to determining the overall profitability of the company. This approach not only adds value to the products or services offered but also strengthens customer relationships and potentially

increases revenue streams. That is how they can become different. If the companies just remain resellers, they end up competing on price and end up selling below the market price just to get customers.

The only other way to differentiate themselves is by adding intellectual property (IP), innovation to make the technology relevant to the local market. Warehousing, buying the physical technology/infrastructure in bulk and warehousing it locally make the delivery of products much quicker. This is the other way to differentiate, but anyone can provide warehousing service. Company 2's participant's focus has been on building the cutting-edge technology skills which are scarce. The company began as a one-person operation, but it has now evolved to the point where the company now employs 13 individuals. This expansion reflects the company's ability to meet the demands of its market and the recognition of its skills and services within the industry. The resources are allocated to projects on a time and material basis to meet a specific need from customers. As such, the company has allocated a training budget to continue to train the existing employees and new recruits to gain skills of certain disruptive technologies they are targeting.

Participants from Company 1 spoke with pride of the graduate programme that company runs companywide to build the necessary skills required to develop solutions as well as manage the underlying technology and services delivered to their customers. This is one area of building technological capabilities. They also have a huge investment in training programs that are suitable to the type of skills required by the company in alignment to technologies and services offered by the company. The company also employs junior staff and upskills them on the job, as well as following the training track for their area of specialty. Lastly, the company utilises its internal HR function to source skilled resources from the market. Even though the principle is to look internally first, there are certain skilled roles that are sourced from the market. Even through Company 2 does not have an internal fully fledged HR function, the owner of the company also recruits externally using LinkedIn as the starting point and taking the

potential candidates through a selection test, followed by an interview to select the right candidate.

Lack of skills seems to be a key issue that was mentioned by participants from both companies and that is what has driven the companies to have a deliberate skills development program in-house. These are some of the processes used to build technological capabilities. Based on the information presented there is however limited focus on research and development by both companies. Only one operating company from Company 1 mentioned that it has a research and development budget to develop new technologies. According to Kim (1997), Li et al., (2011), Lynch & Jin, (2016), Sung, (2009), and Viotti, (2002)

R&D is key for latecomer firms to reach the stage of knowledge accumulation and explorative innovation.

The data presented reveals how the type of BMI that the companies are using? to capture value from the customers. According to participants from Company 1 it is a difficult task to define a price that is acceptable customers however the opco's from Company 1 engages with their existing customers, sales and marketing when defining prices for their products and service. Participant 3 advises that they try and keep the pricing simple and consistently improve on it just like they do the services. The principle around it is to add value to their clients and make them profitable using the services delivered by Company 1. For Company 2, it is challenging to derive a palatable price for the service and resources that outsource to develop using cutting edge technology. This is because there are no skills in the market, therefore that renders the skillset pricey.

The companies rely on several partners to capture value from their technological products and services. Participant 2 from Company 1 mentioned that the company uses partners and resellers to in areas of the country where they do not have presence or reach. While participant 3 must make sure that the operating company's solutions meet the regulatory requirements. So, the credit regulator is a key partner in the ecosystem, as well as developers who consult to such big companies using their scarce skills.

Company 2 on the other hand uses external marketing agencies to get new opportunity leads. Having led both multinationals and domestic IT companies, the expert asserts that multinationals are key partners as the local latecomer companies do not have to reinvent the wheel, they can leverage the existing technology from multinationals and leap to the front without the trouble of being the first. The data certainly reveals how a local partner ecosystem plays a crucial role in value capture for the South African IT companies.

The case study companies have plans to advance their product and service offerings into other countries. Company 2 aspires to penetrate the international market and the participants believe there is a need for cutting edge technology as opposed to the South African market. While Participant 2 from Company 1 also shares the same sentiments, the participant believes the company offers world class solutions that can be exported to global markets and not just African countries. On the other hand, the industry expert believes that companies should continue to develop solutions that solve local challenges such as loss of patient files at hospitals, disparate systems between government departments, high unemployment, and skills development. The view of the expert is that because South Africa is an emerging country it is also faced with challenges that technology can assist to solve. These include improving data capture, file retrievability and queue efficiency for patients entering the hospital.

The participants from both companies aspire to use emerging and transition technologies such as AI, machine learning, digital twin and the internet of things to improve and advance their solutions and service offerings.

Chapter 5: Analysis of data

5.1 Introduction

The focus of this chapter is to analyse and further unpack the findings of the data presented in Chapter 4. The data was collected in interviews with two case study companies of different sizes within the South African IT industry based on these three questions:

- What have the South African IT companies learned from the foreign technology acquired from MNC's to develop secondary innovation that meets local customer demands?
- How do local IT companies take advantage of digital technologies to develop and gain market entry using disruptive innovation?
- How might local IT companies reach original innovation in the South African IT industry and become more globally competitive?

The analysis will be based on the four key arears identified from the literature as the drivers of secondary innovation namely: building technological capabilities, understanding the local market, BMI and network ecosystem.

This research and data collection seeks to understand the process of technological upgrading and secondary innovation in South African IT companies.

5.2 Market Entry Strategy

The literature review in Chapter 3 has highlighted that industrialising countries have employed a similar strategy for development which includes importing established technology from industrialised countries. According to Kim (1980), the implementation of Import substitution and market protection policies have been part of South Korea's economic strategy, especially during its early stages of industrialisation, to reduce a country's dependence on imported goods by encouraging the development of domestic industries. It is what has led to the establishment and growth of the electronics industry

in Korea. The importation of the mature technology has propelled the latecomer companies from emerging countries to learn and gain technological knowledge which did not exist in Korea. Therefore, this importation process encouraged and stimulated more growth of technological industries. Entrepreneurs used the technology industry growth as a window of opportunity to enter a market using tried and tested technology from pioneers (Kim, 1980, 1997) and (Wu, Ma, & Xu, 2009).

The process has since encouraged multinationals in the IT industry to develop partnerships or reseller programs that allows latecomer companies to resell their technology in the domestic countries. These programs come with technology enablement programs that teaches the latecomer companies how the technology work and the benefits of these technologies to position them in the domestic market. As alluded to in the introduction, due to globalisation, many multinationals have flocked? to the South African boarders to benefit from the opportunities presented by this industrialising country. However, there are government policies that prevent MNCs from selling directly to the local companies such as the BEE policy. This policy has encouraged the formation of the many IT companies in South Africa. ~~(2002)~~Drucker (2002) believed that entrepreneurial opportunities arise from changes, uncertainties, and discontinuities in the business environment. The data collected and presented in Chapter 4 confirms that indeed the multinational partnership and technology has enabled the two case studies to enter the South African IT industry.

In Company 1, two of the three interviewed operating companies used the traditional reseller programs and importation of technology from pioneers to enter the market. While the remaining Opco has developed the unique healthcare solution for this market, the development was done on the Microsoft platform. The data reveals that even when the solutions are unique to this market and the Intellectual property and innovation is from the local IT companies, there is a dependency on imported technology. The development of unique solutions by Company 1 was done on imported technology.

Company 2 has used the digital technologies from technological paradigms to enter the market. Company 2 identified a gap in the market for solutions developed using fourth industrial revolution digital technologies such as AI and ML, and has invested time and money to emerge as a solution provider of digital technologies, with the aspiration of growing organically by building solutions that are specific to the local customers' challenges, demand, size, and price. There is no one size fits all, and some of the established out of the box technologies such as SAP are not suitable for the local small to medium size businesses.

Even though the companies did not directly import the technology from technologically advanced countries they have used existing technology from pioneers as an entry into the marketThe companies then focus on developing unique solutions, engaging in traditional reseller programs, and building development skills, particularly in digital technologies such as AI. Therefore, data reveals that the companies have used imported technology to enter the market. Market entry by latecomer IT companies in South Africa is leveraging imported technology from the pioneering companies. The data shows that the start-ups are exploring new market entry strategies as opposed to the traditional reseller partnership.

5.3 Value proposition

The typical stages of secondary innovation are linked to the modes of learning at the organisational level, even though Meyers (1990) originally based these modes of learning on original innovation. Kim (1997) argues that models that enable learning and technological change in a latecomer company within an emerging country are critical in understanding the capability building process followed by the company. The scholar goes a step further and elaborates that the ability to adapt knowledge is a learning capability, while the problem-solving skills signify the ability to create new knowledge.

According to Kim (1997), organisational learning capability enables technological capability development which is required to adapt, use, improve or create indigenous innovation. Wang et al. (2006) advise that by developing effective technological capabilities, a latecomer firm can build and deliver products and services that address

the domestic customer demands in an effective manner. While Salisu et al. (2020) assert that technological capability empowers the latecomer firms to sustain the dynamic changing technology and business environment they operate in from inception throughout company's development life cycle, Salisu & Abu Bakar (2020) suggests that technological capability plays a crucial role in empowering latecomer firms to navigate and sustain themselves in dynamic and evolving technology and business environments throughout the entire development life cycle of the company .

In the study conducted by Wu et al. (2010)the scholars link the four stages of secondary innovation to technological capability levels: duplicative imitation, creative imitation, exploitative innovation, and explorative innovation, as highlighted above in the literature review. On the other hand, Kim (1997) suggests the technological capability can create new products and services in response to changes in the market and demands of the users. In the data presented above the two case study companies have built their technological capabilities to adapt or improve the imported technology in order solve local challenges by using the approaches below:

5.3.1 Identifying Market needs and challenges.

The case study data reveals that in Company 1, one of the operating company's inceptions was sparked by the gap in the market for solutions and services provided to the healthcare industry. By creating operating companies, it gives the operating company an opportunity to build an intimate relationship with its customers. In the study done by Oestreicher (2009) drawing on previous studies, the scholar remarks that market segmentation gives companies a competitive advantage, it allows them to get a better understanding of the customers' needs. The customer knowledge provides an ability to match the customer requirements with company's product offerings. By understanding the customer's needs, the company can source or develop solutions based on jobs to be done, which basically says people buy solutions or services that help them solve problems, complete tasks, and make a difference in their lives. This

theory encourages companies to innovate based on customers' needs, or jobs to be done (Christensen et al., 2016) .

Company 1 developed solutions and services based on unique customer needs per segment. These solutions have evolved based on the demand from the customers in a form of customer requirements due to the company's ability to adapt imported technology locally. Kim (1997) asserts that the ability for latecomer firms to create new knowledge is sparked by solving customers' problems. A participant from operating Company 1 remarked that customers come to them with requirements to be fulfilled and some to consume the already existing solutions because of the value proposition, the systems availability, and the fact that the operating company gets the basics right before they embark on improvements.

As the multinational's technology is not easily adaptable, it requires technological capabilities to improve the technology and combine it with the local market environment context. The solutions and services are developed on top or adjacent to the imported technology to meet the local customers' needs. The solutions provided to health care industry by Company 1 are unique to the South African market and developed by Company 1 using a Microsoft development platform. The solution is an innovation from Company 1. The financial technology operations have developed a proprietary software adjacent the imported technology for the technology to meet the local customer requirements.

The company is flexible in meeting the customer demands. Some of their local customers demand that the development and support team be based at the customer's office to co-create the solution with the customer, while some are happy for the solutions and services to be delivered remotely. This demand prompts the company to ensure that it has sufficient and skilled resources to meet these varying requests.

Even through the model for Company 2 is different, the company has direct customers and relies on partners who get user requirements from customers to pass the

requirements to them. Since the big well-established companies take long to adapt to emerging technology, they source scares skills and competencies from start-ups such as Company 2 with cutting-edge skills through partnership contracts. Company 2 assigns skilled resources to form part of the project team as a sub-contractor to the partner, and develop a solution based on the customers' requirements. In some instances, the big solution development companies such as Company 1 are required by the Preferential Procurement Policy Framework Act (PPPFA), 30% SMME procurement requirements, where the likes of Company 1 must partner with an SMME and allocate 30% of the invoice value worth of work to an SMME as part of the Request for Proposal (RFP) requirements especially the public sector RFP's (National Treasury, 2017).

Some of the leads Company 2 gets are as referrals from existing direct customers endorsing their work and solutions. These requests have presented Company 2 with an opportunity to build their technological capabilities by getting involved in big projects, learning, and creating new knowledge as they solve problems of the local customers and demands. The demands and new knowledge created translates into growth opportunities for the company; hence Company 2 now employs 13 people. Company 2 focuses on using emerging technology to meet the local customer requirements. Several of these solutions are crafted to enhance the efficiency of the customer's business, and also to address broader societal issues, exemplified by endeavours such as mitigating the energy crisis in South Africa.

(2009)(1997) The industry expert's advice closely aligns with the perspectives of Wu, Ma, & Xu (2009) and Kim (1997), emphasising the importance of localising imported technology. By doing so, a latecomer company can enhance, customise, and extend the application of the improved technology to various industries in the local markets. The industry expert suggests that companies can only differentiate themselves from multinationals with generic products that have worked in their country of origin by adding a local flavour to it. According to Wu et al. (2014), some pioneers from developed countries turn to produce innovation that only works in the developed countries only, since they do not consider the emerging countries' requirements.

One of the participants from Company 1 remarked that it is difficult to get OEMs to fix bugs identified by customers, as emerging countries' requirements are just not considered in the product development lifecycle. Therefore, the obligation sits with local companies to consider domestic requirements and as such, build the necessary competencies and capabilities to meet these requirements using innovation.

5.3.2 Organisational learning and technological capability building

According to Kim (1997) industrialising countries can benefit from government policies that encourage latecomer companies to build technological capabilities. In line with this, the South African government introduced Act 9 of 1999, known as the Skills Development Levies Act, aimed at motivating companies in South Africa to intentionally enhance the skills of their employees, thus fostering improved productivity and competitiveness in the job market (Skills Development Levies Act, 1999). This Act benefits both the company and the employees. While the company invests money to train the employees, it can build competencies and knowledge required to meet customer demands as well as attract talent to the company as this investment is viewed by potential employees as a benefit for growth and development.

The findings from data presented in Chapter 4 highlight the importance of developing the right skills to meet the market demands. As the technology changes, the companies in the IT industry are propelled to keep up with the change by building new competencies aligned to their business strategy and customer requirements. Company 1 invests in attracting graduates fresh from university and offers them specialised training aligned to the solution and service offerings of the company. There is a drive to get the employees certified in the technology that they specialised in. Obtaining the right level of certification is a requirement by the OEMs for the company to retain their OEM partner status as well as advance to the top tier level.

The OEMs have built into the partnership programme, a training and certification plan that includes training vouchers that can be redeemed by the partners to get their technical resources certified in a particular track. ~~(1997)~~This aligns with Kim's (1997)

perspective that latecomer companies can achieve significant technological capability building through collaboration within a network of foreign partners. Even though the foreign partners make this training and learning capability available to latecomer firms, Oestreicher (2009)argues that the ability to build technological capabilities rests on the intentional effort of latecomer resources to utilise the learning opportunity and platform made available to them by the partners.

The data also reveals how both companies have set aside a training budget to continuously upskill their workforce and maintain the certification required to provide the solution and services they deliver. It is aligned with Li (2011), who argues that latecomers must put in a concerted effort by investing internal assets such as training budget to build high-level technical capabilities while leveraging a network partner ecosystem. In Hansen and Ockwell (2014)' study, the companies in Group 2 of their study that did not invest in internal resource development where unable to achieve the high-level technological capability building such as production and innovation capability. Lastly the companies in this study also sourced skilled resources from the market in the form of employment as and when required, especially when those skills do not exist internally.

Sometimes, the skills are sources from labour agencies or local IT start-ups, as indicated by data from Company 2 on a time-and-material basis. Chen & Yin (2019) and Hansen and Ockwell (2014) encourage latecomer companies in the same industry as a key learning source to build basic technological operating capabilities, by creating knowledge spillovers within the local network. Due to lack of R&D budget and facilities, latecomer companies can learn from each other especially in the early stages of capability building.

Even though this process will not propel latecomer firms to achieve high levels of technology capability to develop endogenous innovation, it is a crucial building block for start-ups. Latecomer companies should leverage the local partner network as we see in the Company 2 model, this company consults and participates in big development

projects that are ran by established companies as a subcontractor. Company 2 learns from these complex projects and builds higher levels of competency.

5.3.3 Business Model Innovation

According to Wu & Li (2015) for latecomer companies to succeed in their domestic market they must combine the market knowledge with a network ecosystem and a palatable cost structure to form an effective business model. A business model allows them to produce and capture value from customers in a strategic manner and achieve a competitive advantage (Teece, 2010). Wu & Li(2015) advise that latecomer firms with less developed technological capabilities in China have achieved successful growth by adapting a BMI from pioneering companies in a form of secondary BMI. While Wu et al. (2010) suggest that latecomer companies can introduce disruptive technology by adapting a secondary BMI from pioneering company and localising it (Baden-Fuller & Haefliger, 2013; Banda et al., 2022; Lamperti et al., 2023; Mehrotra & Velamuri, 2021; Vaska et al., 2021). This advice is aligned with Teece (2010) who indicated that technological change often prompts a business model change for companies to explore better ways of meeting customers' needs while capturing value. The findings of BMI are based on the following categories, namely, solution commercialisation and network partner ecosystems outlined in the following sections.

5.3.4 Solution Commercialisation

The research data reveals that both companies in the study have explored different ways of creating and capturing value from domestic customers. Company 1 engages in different ways of defining and pricing the solutions and services offered. The company collaborates with existing customers and partners during the solution development lifecycle to derive a price that is acceptable by the market. As products are tested in the pilot phase, the price is also tested and adjusted accordingly based on feedback received. The sales and marketing team, including partners that resell the solutions, also provide feedback based on their knowledge of the market.

The other element considered is the value provided by the solution. There is care given into understanding the customer requirements for the solution to address the challenge experienced by the customer while delivering value through jobs to be done. The company takes into consideration the input costs and the fact that the end customer must capture value by using the solution, while the resellers also derive value and sustain their business by selling the technology to their customer base. The company understands that the value ecosystem is not one-sided, all the players in the ecosystem must benefit from the solution.

The lack of experienced technological skills in the IT industry plays a key role in defining prices for services and solutions, especially because the solutions are resource intense. And in situations where a customer requires the resources to be based onsite, there are no economies of scale achieved among multiple customers, the level of productivity is low due to one-to-one mapping of skilled resources per customer. However, Co1Part4 mentioned that the customers are willing to pay for the services offered due to lack of IT skills in South Africa. The company applies the process of continuous improvement looking for opportunities to do things better and reduce cost while improving the solution, by automating some tasks and finding efficiencies.

In terms of Company 2, the services are priced based on the customer's requirements. For skilled resources to form part of the development team on an ad hoc basis, a time and material price is given to the partner company. However, for a sub-contracting opportunity, a solution cost is derived based on the resources allocated and scope of work. Setting an acceptable price for the services and solutions offered by the company poses a challenge due to the scarcity of developers possessing cutting-edge technology skills. The high demand for these scarce skilled resources drives the cost of services up. There is no market regulation of what to charge as the services provided by Company 2 are niche and emerging. Emerging technologies seems to cost more. ~~(2010)(2005)~~This is consistent with Utterback & Acee (2005)'s viewpoint, indicating that emerging technologies with elevated prices are first introduced in mature markets before expanding into emerging markets. Conversely, Christensen et al. (2002) and Wu

et al. (2010) contend that disruptive technologies with lower costs and performance are initially introduced in emerging markets to capture new market segments, progressively improving over time. Once they gain momentum and enhance functionality, these technologies subsequently transition into more traditional or mature markets.

According to Wu & Li (2015) start-ups such as Company 2 have an added advantage in commercialising disrupting technology such as shorter time to market due to demand and the fact that they had no history attached to mature existing technology and partner network obligations. These advantages benefit the start-up in creating value from emerging technology. ~~(2015)~~Wu & Li (2015) assert that the demand for emerging technologies, coupled with a scarcity of skills in this domain and the size of the company, particularly smaller and more agile entities like Company 2 possessing resources with the requisite skills, makes them ideal candidates for introducing emerging technology in domestic markets. Established latecomer companies turn to experience chaos during technological paradigm shifts that introduce disruptive technology, due to the pressure to change their business model (Wu & Li, 2015).

The industry expert also asserts that companies that offer solutions and services beyond the reseller partnership by adding innovation to the OEM technology can charge their base price that was defined by the market and charge for the additional value offered. IT companies in South Africa that have advanced beyond the reseller of commodity services can charge more for their services and grow their business as well as service offerings.

5.3.5 Network partner ecosystem

As already indicated in the BMI, the partner network plays a crucial role in the BMI. Wu et al. (2010) believe that latecomer companies can leverage their strategic partners' assets to overcome the challenges they face such as limited resources and offer value to their customers.

The OEMs are key partners to South African IT companies as deduced from the data in Chapter 4. The industry expert confirms this by affirming that multinationals are the most important partners in this industry. The systems integrators such as Company 1

develop their solutions using base technology while solution developers develop on top of the multinationals' base technology. Co1Part1 mentioned that the company is one of the biggest Microsoft customers due to the amount of development that happens on the Microsoft Azure platform. There is a huge investment by the global hyperscale's and other multinationals who have built datacentres in South Africa. The datacentres allow local IT companies to connect to the cloud in South Africa without the huge infrastructure investment required to deliver solutions and services.

Solution developers can develop their solutions in the cloud, which makes the solutions accessible by the global market as well as meets the data sovereignty issues in terms of which data should stay within the borders of South Africa. Microsoft and Amazon have opened datacentres in Cape Town and Johannesburg. It gives the latecomer companies an added advantage of catching up without putting down an investment for infrastructure and technology. Both companies in this case study leverage AI and machine learning technologies that are already available on hyperscale platforms, allowing the company to use disruptive technology to advance. The findings reveal that Company 1 has embedded AI capabilities in the new solutions using expertise from a partner.

Latecomer companies can engage in the following process to obtain Microsoft partnership: Join the Microsoft Partner Network | Choose your selected area(s) | Acquire your membership | Identify the appropriate licensing agreement | Assemble and develop your team | Provide training for your team | Identify and manage your customer base | Establish and enhance your practice | Seek recognition for your efforts | Foster the growth of your practice (Your Guide to Building and Growing a Successful Microsoft Practice How to Become a Microsoft Partner, 2021).

For an IT company to be become a Microsoft partner, they would need to follow the process above According to the partnership level, Microsoft recommends and forwards opportunity leads to companies possessing the necessary skills and experience to meet customer requirements. The partnership level defines how good the company is in selling, supporting, and improving the imported technology. As the company gets recognised, the level of OEM status goes up and so do the financial rewards, rebates

and other benefits associated with the partnership program (‘Microsoft Expands Cloud Services in South African Data Centres to Drive Growth and Competitiveness – Middle East & Africa News Center’, 2022)

Apart from the OEMs and multinationals, other partners that the companies in the study leverage are reseller partners. Company 1 uses resellers to sell their unique solutions developed to address gaps in the private health care industry. These resellers stretch the company’s reach without establishing physical offices in all provinces, cities, and towns within South Africa. The company has adopted a BMI used by multinationals and use it in the local market to capture value as advised by (Wu et al., 2010). Company 2 plays a role of partner to companies such as Company 1 by providing these companies with cutting edge technology skills for Company 1 to adopt emerging disruptive technology and meet the customer requirements.

According to the findings, Company 1 partners with financial regulators to ensure the financial solutions meet the regulatory compliance requirements. While Company 2 uses partners such as digital marketing agencies to market and identify leads for the company’s services. The company also relies on established solution development houses to capture customer requirements and subcontract Company 1 on big solution development opportunities. To meet the BEE and PPR compliance, Big IT companies such as Company 1 partners with start-ups such as Company 2 to meet the RFP requirements. This process facilitates local effort spill-over as well as achieves basic operating technological capability building.

Partners play a key role in technological capability building and form part of the complex model that allows latecomer firms to build high level capabilities that enable a company to produce endogenous innovation. They make available learning opportunities for latecomer companies to develop the necessary skills required to interrogate and adapt the new technology.

Established big IT companies can build basic operational capabilities by learning from start-ups, while start-ups develop higher level of competencies working on big complex projects. Learning that results in the development of endogenous innovation is achieved through learning from foreign partner learning platforms, a conceited investment of significant internal resources, learning from the local network partners, as well as internal experimentation by learning from big projects or research and development (Hansen & Ockwell, 2014) Latecomer companies can successfully commercialise disruptive technologies to customers who are price sensitive by articulating the value of the solution (Wu et al., 2010).

5.3.6 Digital technologies and future growth opportunities

The literature review has highlighted the role of technological paradigms and technological change in emerging countries and industries. According to Wu & Zhang (2010), a technological paradigm presents latecomer companies with an opportunity to progress their technological offerings rather than be stuck in the old and mature technology. Kim (1980, 1997) believes the Korean latecomer companies used transition (consolidation) and fluid (emerging) stages of technology development to advance. On the other hand, Wu and Zhang (2010) report how Chinese firms with disadvantaged backgrounds have skipped some of the sequential steps followed by Korean companies and still succeeded in achieving technological advancement by following the secondary innovation framework.

It is noted that the established leaders find it challenging to take advantage of technological paradigms such as 4IR in a radical manner, as it requires a change in the business model and strategy. Chinese companies used environmental opportunities presented by the technological shifts and technological changes that China was undergoing and combined those with market knowledge of the unique characteristics of the domestic market. Just as there are technological changes, the market also undergoes changes, and this change is usually not projected. The Chinese companies chose to leverage disruptive technology, focusing on crafting a robust service innovation

with expedited turnaround times, and establishing a robust collaborative ecosystem for research and development (Wu & Zhang, 2010).

The data from the study shows how Company 1 of the case study has plans to incorporate emerging technology such as digital technologies to advance their services offered to customers. The company has intentions to transform to a software as service driven company that leverages digital technologies such as the Internet of Things, machine learning, artificial intelligence, and big data to derive more value from services offered to the market.

There are also plans to partner with a hyperscale company from a more advanced country to offer application replatform services that will enable customers to move legacy applications into the cloud platform at a Rand base price point that will be affordable to the local customer. Dollar rated services turn out to be more expensive for the local customers, especially price sensitive customers, and that prevents customers from moving to the cloud and benefitting from the value of disruptive technologies.

Keeping up with technological and market changes is what has kept Company 1 in business for over 50 years. This is however a costly exercise as it means a change in the business operating model as well as continuous training and certification needed to adopt emerging and disruptive technology while maintaining the higher partnership level achieved due to mature technology. Co1Part 4 mentioned that the company remains relevant by selecting the disruptive technologies that are aligned to the strategy and outcome the company seeks to achieve from using the technology. The company has a yearly certification programme to follow, learn and build technological capabilities. The systems integrator service links competing multinationals to work together. With customers consuming cloud platform from multiple providers the company has plans to aggregate the OEM technology and services offered to customers on an on-demand basis in a seamlessly manner.

One of the operating companies of Company 1 has invested in a platform business and has plans to extend this business to other service providers who can offer their services

using the Company 1's platform. This is another form of secondary BMI. The concept is currently used by pioneering companies from more advanced countries, such as Airbnb, Uber, and YouTube. This plan will enable Company 1 to build a network ecosystem and move away from just software developers. The use of a business platform model has the potential to create new companies in the form of start-ups that will offer their services on an existing platform without incurring the cost of developing their own platform.

The one operating company plans to import digital financial devices that offer more functionality and replace the old static devices. This is a consultative exercise with existing customers to collaborate and figure out the solution and functionality of the device and ability to meet the customers' requirement. The change in base technology prompts the company to build new capabilities by training their workforce and change the existing business model. The company aspires to offer the existing mature solution and services to the international markets especially the mature endogenous health care solutions that were developed specifically for the South African health care industry. Those solutions and services have stood the test of time.

Company 2 plans to develop solutions that can be productised and bring recurring revenue using machine learning. The company is targeting the energy sector which is currently experiencing huge challenges in South Africa, such as rolling blackouts. The growth of prospectus industries and South African economy are affected by these blackouts negatively. The company plans to use market knowledge, combined with technological capabilities to develop solutions with emerging technologies that solve societal challenges associated with load shedding (Hansen & Ockwell, 2014; Wu et al., 2010b; G. Xu et al., 2015b). There are further plans and aspirations to offer services to the international market due to the slow uptake of emerging technologies in South Africa. There is a huge demand of IT skills in international markets, which leaves South Africa with a brain drain as the skilled persons look for greener pastures in international shores (Oyelaran-Oyeyinka, 2014).

5.4 Summary

The summary of this chapter is positioned to answer the research questions.

Research question 1: What have the South African IT companies learned from the foreign technology acquired from MNCs to develop secondary innovation that meets local customer demands?

The South African IT industry presents attractive opportunities for multinationals that are looking to grow and expand their operations in this emerging market. However, the opportunities are met with challenges. According to Dipha & Katrodia (2022), a majority of these multinational are not willing to embrace the dynamics presented by the African markets and end up failing as they try to implement the strategy and business model that worked in their home country into emerging countries (Wu, Ma, Shi, et al., 2009). The Reseller Partnership by IT multinationals has since presented a window of opportunity for these multinationals to penetrate the South African Market using partners. The findings of this report show that the South African IT companies that have entered the market using partnerships with multinationals, gained basic operating knowledge of how the technology works through learning opportunities presented by the multinationals. To progress beyond a reseller partnership and address local challenges, the companies' combined knowledge acquired from multinationals with internal capabilities developed through trial and error, enhancing the functionality of imported technology to align with the needs of South African customers.

The findings also show how South African IT companies have produced endogenous technological innovation by developing solutions unique to the South African market using multinationals' development platforms. To achieve this endogenous innovation the companies had to learn and understand the development platform. It was through trial and error, persistence, and tenacity. For Company 1 to reach over 50 years of operations and survive the apartheid regime and the evolution of South Africa from isolations, sanctions, oil embargoes, rand depreciation, foreign exchange regulations, political upheaval and transformation, it was because of resilience and tenacity. By

simply remaining a reseller is not enough, as that captures very little value from the customer, developing endogenous innovation that works on top of, or adjacent to the imported technology to meet domestic gaps is what differentiates and determines growth and success. The data does not reveal the actual steps followed by the company to produce endogenous innovation. It also does not show how long the process took.

Research question 2: How do local IT companies take advantage of digital technologies to develop and gain market entry using disruptive innovation?

COVID-19 has fast tracked the digital transformation of many South African companies, with companies in many industries forced to transform the business models and adopt a cloud strategy because of the pandemic protocols of lockdown. Companies had to quickly find ways to enable their workforce to operate remotely (Godlonton, 2021)). As a result, the South African IT industry has experienced tremendous growth because of the COVID-19 pandemic opportunities. The emerging working environment models post-Covid such as hybrid work models present growth opportunities for IT companies, according to

Godlonton (2021). CIOs are exploring multi-cloud strategies and the cloud maturity within South Africa is expected to grow exponentially. On the other hand, Intergest (2022) points out that the CEOs of a mobile application development company remarked they have been overwhelmed by an increased demand for mobile app development by consumers (Cuadrado & Dueñas, 2013; Nandi et al., 2021; Omwansa et al., 2013; Rakestraw et al., 2013). According to Knoesen & Seymour (2019) and Blanco et al. (2022) the advent of mobile devices, in particular, has fuelled innovations and the widespread development of software applications, enhancing the utility of these technologies. As smartphones and internet access have spread globally, mobile apps (applications) have emerged as a valuable complementary technology, reducing transaction costs, and facilitating interactions between consumers and producers (Cuadrado & Dueñas, 2013; Knoesen & Seymour, 2019). The IT industry in South Africa report, Markets ltd (2022), states that the digital transformation enables

companies to use insights from data to gain a competitive advantage. These insights are driven by digital technologies such as machine learning, data analytics, artificial intelligence, and the internet of things.

The findings of the study show that there is ambition and plans from big IT companies such as Company 1 which used OEM partnership as a market entry strategy to evolve their service offerings by using digital technologies to take advantage of the opportunities that lie ahead. However, Company 2 of the case study used digital technology as an entry into the South African IT market, by offering machine learning skills and app development expertise to established IT companies such as Company 1 and the South African business market. According to Co2Part1 the company has achieved tremendous growth since the Covid pandemic as the customers are more interested in digital solutions. Even though the company is profitable, the findings reveal that the uptake of digital technologies is quite slow in the South African market and creates frustrations for start-ups. One of the mobile applications developed by Company 2 was nominated for app of the year in 2022 for a mobile app developed for an energy start-up.

To answer the research question, the findings reveal that there is a change in the market with South African IT start-ups using digital technology as a market entry strategy. The IT start-ups do so by partnering with established IT companies and digital agencies that lack the skills to develop and use digital technologies. Company 2 entered the market by first offering consulting services to established companies based on customer project requirements. Through this process, the start-ups enriched the technological capabilities that enabled Company 2 to develop endogenous innovation while solving societal challenges for their direct customers.

5.4.1 Succinct answers to the research questions

Table 13: Summary of findings

Research Question	Summary findings
What have the South African IT companies learned from the foreign technology acquired from MNCs to develop secondary innovation that meets local customer demands?	South African IT companies that have existed for more than 10 years and entered the market through MNC reseller partnerships have learned from the MNCs through trial and error of interacting with the technology from MNCs. These companies have developed incremental improvements and service solutions that meet the local market needs and price expectations. Simply remaining a reseller has no value add to the local market with little economic growth opportunities. These South African IT companies have followed the Brazilian strategy of advancing beyond licensing partners or distribution partners by identifying local customer needs and meeting these needs using mature technology from MNCs. The South African companies have built capabilities in installation services, outsourced managed services and consulting services to bridge these gaps that MNCs could not fulfil at a palatable price point for the local market
How do local IT companies take advantage of digital technologies to develop and gain market entry using disruptive innovation?	SMEs are presented with different market entry opportunities. They leverage the digital technologies as a market entry opportunity and bypass the MNC reseller program. Through digital technology, the SMEs have

	developed endogenous solutions that solve local market challenges. The big IT companies such as Company 1 are under pressure to evolve and adapt the service offerings and business model innovation to leverage digital technologies. The research shows that the local IT companies used BMI and exaptation to capture new customers and adopt new technologies to meet local customer demands. This is a constant process employed by IT companies to navigate the dynamic competitive market and remain relevant.

Table 13 presents a summarised findings and key answers the study aimed to answer. These findings are based on a small sample and cannot be generalised to the entire IT industry. The next chapter outlines key findings, conclusions, recommendations, and limitations of the study.

Chapter 6: Recommendations and conclusion

6.1 Introduction

Technological upgrading can improve the South African economy, taking into consideration the complexity and dynamic challenges of the country. Previous studies have reported that a positive economic growth in a country is associated with technological upgrading (Mellet, 2007). Technological upgrading can improve productivity in South African businesses while increasing their competitiveness in the global market (K. Lee et al., 2020; Peng et al., 2022) .

Post the Covid pandemic, digital transformation is one of the key trends on the CIO's agenda as it has the potential to automate the business operational processes for businesses to adapt the new work environment models. The South African IT industry is therefore faced with a mammoth task of enabling digitisation in the economy.
The study followed a methodical literature review unpacking secondary innovation framework and how the framework can be applied by latecomer firms to achieve technological upgrading.

Based on the findings from the literature review a new conceptual model was designed to provide insight as to how South African IT companies can combine indigenous technological capabilities with emerging technologies to produce endogenous innovation that meets domestic market requirements. This chapter summarises the outcomes of the study for the following focus areas: market entry strategy, organisation learning and technological capability building, BMI and technological paradigms and growth opportunities.

6.2 Research Questions

The following key questions were explored by the study:

- What have the South African IT companies learned from the foreign technology acquired from MNCs to develop secondary innovation that meets local customer demands?
- How do local IT companies take advantage of digital technologies to develop and gain market entry using disruptive innovation?

6.3 Key Conclusion of the study

The OEMs play a key role in the advancement of IT companies in South Africa and the ability to meet the domestic market requirements using OEM based technology either in a form of mature or emerging technologies as an entry to market and an opportunity to produce endogenous innovation. Research from emerging countries found that technological capability lays the foundation for latecomer companies to produce secondary innovation as suggested by Kim (1980,1997), but according to Hansen and Ockwell (2014) the latecomer company must make a deliberate effort to learn from the pioneers, invest internal resources and leverage the local network partner ecosystem to produce endogenous innovation.

According to Wu et al (2010; 2009) (the latecomer companies from emerging countries with complex market conditions and disadvantaged technological capabilities can skip some of the sequential steps followed by the Asian tigers to produce secondary innovation and achieve catch-up. The path to secondary innovation is a non-linear path, it is dynamic in nature, as discovered by (Wu & Li, 2015). Latecomer companies can acquire either mature or emerging technology from the pioneers to develop secondary innovation combined with a BMI to meet gaps in the domestic market.

The literature review highlights the significance of technological paradigms, offering startups with limited technological capabilities an opportunity to enter the market by leveraging the local partner networks and articulating the value of emerging technologies. The study conducted on South African IT companies reveal similar

findings as those of the literature review. Six interviews were conducted with two CEOs, three managing directors and one industry expert as the third source of data to achieve triangulation.

6.4 Major findings

There is congruence between previous studies conducted in emerging countries, the literature review and the findings of this research. The study confirms that latecomer companies rely on the acquisition of technology from the pioneers to build technological capabilities and ultimately produce secondary innovation. The South African IT companies entered the IT market by leveraging the existing technology from multinationals either through OEM partnerships to sell and support the imported technology or by developing solutions using the OEM technology platforms. These OEM partnerships benefit both South African IT companies and the multinationals to achieve economic expansion.

The multinationals hold limited knowledge about the local market and their business models are not suited for the dynamic market conditions posed by the South African environment. Local IT companies already hold legitimacy to operate in South Africa and understand the market better. However, reselling the technology to local customers alone does not deliver value, it is just a mere transaction, it is an assimilation process as defined by Kim (1980,1997), latecomer companies can only develop basic operational technological capabilities as opposed to high level engineering and R&D expertise (Hansen & Ockwell, 2014).

Company 1 was able to move up the value chain and advanced beyond reseller status, by adding service and solution innovation to the OEM technology, thereby charging more for the secondary innovation on top or adjacent the technology service to achieve sustained growth. According to Wu et al. (2010), latecomer firms can charge more for technological services by articulating the value proposition to customers who are price sensitive The analysis revealed that South African IT Companies such as Company 1,

added the basic operating capabilities developed during the reseller stage, indigenous technological capabilities achieved by investing money, and allocating a training budget to achieve the necessary certification required to support the OEM technology to advance beyond the reseller partner and adding value services to meet the local customer demands. Company 1 offers value added services such as installation and setup services, custom development services based on customer use cases as well as Managed Services.

Due to lack of legitimacy and the complexity of changing the business model, the multinationals such as Microsoft and Huawei created an opportunity for local companies to provide after sales support, maintenance, and management services for the OEM technology. Wu et al. (2019) advise that multinationals that lack regulatory legitimacy can define legitimacy strategies such as adapt a new BMI, as legitimacy plays a key role in accessing markets, customers, and partners. The systems integrators can sell, implement, support, and manage off-the-shelf technology from multiple OEMs. Their management of the technology is called managed services which is a secondary innovation developed by South African IT companies. Managed services are structured in a form of outsourced contracts that run for one to five years at a fixed cost, which is a guaranteed revenue for the duration of the contract.

Through this day-to-day interaction with the technology, South African IT companies have developed higher technological capabilities and are able to improve the functionality of the OEM technology based on the customer demands by developing solutions that will deliver the custom requirement from the customer.

Market changes like new government policies and digitisation can present innovation opportunities for South African IT companies. In response to these changes, companies often find it beneficial to invest in the development of their human capital. This includes training and upskilling employees to adapt to emerging technologies, comply with new regulations, and leverage innovation opportunities. A skilled and adaptable workforce is essential for organisations to navigate dynamic market conditions, capitalise on opportunities, and remain competitive in evolving landscapes. It is congruent with

Drucker (2002) who advised that changes in the market present an opportunity to innovate. According to the Mena Report (2023) the South African government, under the leadership of the Minister of Communication and Digital Technology, has allocated funds to establish an innovation hub. This initiative aims to foster the creation of new IT products by SMEs in the ICT industry. As part of broader endeavours to enhance digital connectivity and engage citizens in modern society, the inauguration of this innovation centre is anticipated to be advantageous for small businesses within the Information and Communication Technology (ICT) sector. Through collaboration, these businesses can develop innovative products to address challenges faced by ordinary South Africans.

Based on the findings, system integrator companies are constantly playing catch-up to meet new requirements. There is technology pull as domestic customers specify the requirements that propel the IT companies to upgrade their technological knowledge. If the company does not possess the necessary skills and competency, then the skills are sourced from the market. Start-ups and independent consultants are likely to hold the required skills. According to the literature by Hansen & Ockwell (2014), in the process towards secondary innovation, latecomer companies are encouraged to use both local and external partner network ecosystem to develop higher technological capabilities that put the latecomer company in a better position to innovate. Apart from implementing packaged OEM solutions, Company 1 has built custom solutions to meet the customers' unique business functions. This innovation is deemed as secondary innovation.

Meanwhile, South African IT companies that identify the gap in the market use a technology pull strategy. They are always ahead of the curve and likely have developed endogenous technology. Based on the gap identified in the market, the local IT companies studied the global market trends and identified and adopted a suitable OEM technology to close the gap. The absence of an OEM technology that meet the complexity of the South African market and unique characteristics of the customers

environment, such as size of the company, services delivered to the market and budget have propelled South African IT companies to develop a solution using a combination of mature and emerging OEM technology. The companies also build a local partner network to achieve sustainable growth. The South African IT companies adopt a secondary BMI by formulating a partnership programme like those from multinationals to grow the reach of the solution. The outcomes of secondary business model innovation (BMI) contribute to the establishment of new startups entering the market and forming a partner network ecosystem with OEMs and MNCs. Furthermore, the IT companies used BMI with exaptation to reinvent their business offerings taking advantage of new and emerging technologies to meet local customer demands at the right price point.

There is an entrepreneurial ambition represented by the number of IT start-ups sparked by emerging technology and the interest in solving societal challenges. The study found that digital technologies present start-ups with an opportunity to enter the IT market without following the traditional partnership program. Start-ups can develop solutions using emerging technology to do things better and faster by automating tasks and analysing existing data using digital technologies such as machine learning and Artificial intelligence to make informed decisions. Alexander (2021) believes that at a macro level, 4IR technologies can increase the country's competitiveness, enhance opportunities for start-up, while reducing capital costs.

Digital technologies present opportunities for the companies to acquire new knowledge through training and certification as well as partnering with established big IT companies to develop and support the emerging technologies. Drucker (2002) suggests that adoption of emerging technology by start-ups will challenge established IT companies as it becomes the new way of doing business and rendering the traditional business model obsolete while disrupting the industry. By using digital technology, South African IT companies can create or transform products and services offered to the market, as well as the business processes and models currently employed at a firm level (Skog et al., 2018).

The findings confirm that South African IT companies have used the traditional multinational reseller programme as an entry to the market and have advanced beyond that phase by offering service-based solutions to local customers consuming imported technology to enable business processes. There is however a new market entry opportunity presented by emerging digital technologies. This has created an entrepreneurship ambition for start-ups to enter the market without using traditional OEM partnerships. Based on the findings, South African IT companies can utilise emerging technologies, such as machine learning and AI to address societal challenges. Automation of complex tasks that cannot be carried out by current resources due to a lack of skills is one of the potential applications of these emerging technologies. Moodley (2024) suggests that AI could also be valuable in real-world clinical workflows associated with diagnosis or triage, particularly in resource-depleted settings such as South Africa (SA), as well as in participant enrolment for clinical trials. According to research done by Godlonton (2021) there is a skills shortage in the country due to the brain drain caused by global market competition for skills whereby experienced professionals are offered huge salaries by international companies.

The case study reveals how Company 1 achieved endogenous innovation by developing a unique solution for the local private health care services to close the gap in the market that was under serviced by multinationals. When Company 1 developed this unique solution, there was no similar solution that existed in the South African market which renders it endogenous innovation. However, there is no defined Innovation management strategy with a lead that manages the process of idea generation and a companywide R&D division. Research and development seem to happen in the siloed operating companies.

South African IT companies can achieve secondary innovation that is unique to the South African country or industry by identifying a unique challenge in the South African market that can be solved by technology. The innovation might not be original to the world however it will be unique to South Africa rendering it endogenous innovation. It is

not clear from the data collected and finding how the South African IT companies can develop original innovation unique and new to the world. The emergence of new technologies presented opportunities for novel partnerships and the redefinition of existing process and business model architectures. This adaptive approach played a crucial role for local IT companies to maintain competitiveness in the local market against MNCs. Furthermore, the integration of emerging technologies served as an avenue for capturing new customers and fostering the growth of new IT start-ups.

6.4.1 Recommendations

This section provides recommendations to the South African IT companies based on the findings of the study.

6.4.1.1 Recommendations for company 1

1. Define an Innovation management strategy to generate and manage innovation ideas from employees that engages with customers daily and likely to come up with novel ideas that the company can focus on to ultimately develop original innovation. Appoint a knowledgeable and experienced lead to manage this process.
2. The company should consider an inclusion of R&D practice and budget that can be leveraged by all the operating companies, the combination of the different skills and technological capabilities have a potential of producing a novel idea that will solve existing societal challenges and benefit the South African economy, as opposed to the siloed operation that currently exists.
3. There is a big drive by the president of South Africa to prepare the country to benefit from the 4IR technological paradigm. This current technological paradigm will propel the company to the front as it has the potential and capabilities to solve challenges currently faced by the country. The company should take

advantage of this window of opportunity and create a task team to identify a societal challenge that can be solved by the company. As highlighted above Company 1 has the necessary resource to produce a novel innovation, but a deliberate focus is key to this achievement. Focus must be beyond the incremental improvement of OEM technology. There is a need to extend the network partnership beyond the South African borders.

4. Encourage collaboration amongst the existing IT companies to solve societal challenges and create a strong network ecosystem as opposed to the competitive rivalry that currently exists. Find one societal challenge and create a network ecosystem that includes university, students, government, and society. Collaborate, and develop a solution for the identified challenge and produce original innovation that does not exist anywhere in the world using digital technologies. The innovation has a potential to benefit the society, South African IT companies, government, and the South African economy.
5. To compete with global competitors, must formulate a firm innovation system (FIS) centred around a companywide innovation management framework, with an innovation strategy, innovation culture and motivated resources (Chen et al., 2020, 2021). Zuraik (2017) asserts that a shared strategic vision allows for people to collaborate and work together with a clear purpose. Company 1 can bring together all the resources and R&D initiatives of the Opco's to build an FIS that will improve the company's competitiveness and innovation capability.

6.4.1.2 Recommendations for Company 2

South Africa is afflicted by several challenges that can be addressed using technology. Identify a societal challenge that can be solved by technology.

1. Through BMI, expand the network ecosystem to encompass a broader spectrum of stakeholders within the market, incorporating entities like universities, students, government bodies, and society at large. Foster collaboration among these diverse participants to collectively address the identified challenges.

Through this collaborative effort, aim to conceive and develop a groundbreaking solution that goes beyond the current boundaries of innovation in the country. Strive to create a disruptive innovation that stands out by being unparalleled and unparalleled anywhere else in the country. The innovation has a potential to benefit the society, South African IT Companies, government, and the South African economy.

2. To alleviate frustration arising from the slow adoption of emerging technology, it is essential to understand the core focus of customers' businesses and challenges. Pivot from emphasising the technology's functionality to focusing on how it adds value by addressing specific business challenges. This shift is intended to position the practical benefits and tangible advantages that the technology offers to customers' businesses, moving beyond the mere highlighting of aesthetic or superficial features. Identify jobs to be done in the customer's business, especially complex tasks that take long to achieve, and develop a solution to alleviate the pressure. Customers will show interest in that innovation.
3. Advance innovative solutions to the rest of Africa with unique challenges such as those in South Africa before exploring the international markets. Create a partnership with African countries to advance the innovation.
4. Leverage and partner with the existing network actors such as universities, government research departments, local innovation hubs and existing IT companies to research local information and create endogenous innovation to advance the technological capabilities. The literature review has revealed the importance of searching locally and solving local challenges, it provides added benefits of growth and is a steppingstone into building sustainable innovation capabilities to become a global player.

6.5 Limitations of the study

- The study was limited to only two South African IT companies of different sizes, a big established company and a start-up which makes it difficult to generalise the findings to the rest of the South African IT companies.

- The study focused on internal processes to achieve technological upgrading. However, there was very little focus on the role government and regulatory policies play to support and encourage South African IT companies to achieve technological upgrading.
- The market entry strategy, composition and services offered by the companies were vastly different, which made the comparison a bit challenging.
- Limited focus on the impact of BMI on company performance

6.6 Possible areas of future study.

- The study found that South African IT companies have produced endogenous innovation, but further investigation is required to assess whether this innovation is only new to the South African market or to the world.
- Further studies must be conducted to ascertain the process and duration of technological upgrading by South African IT companies through a longitudinal study.
- Increase the scope of the study to include more than two South African IT companies. The study should represent the demographics of the South African IT industry.
- A further investigation on the role of the government in enabling the development of original technology innovation by South African IT companies is needed.
- Investigation of the process followed by South African IT companies to achieve sustainable BMI.

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Appendix A: Introduction to research project



The Graduate School of Business Administration

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Good day Date: 11/29/2022.

My name is Thabitha Motau, and I am a master's student in Management in the field of Innovation Studies the University of the Witwatersrand, Johannesburg. As part of my studies, I must undertake a research project, and I am investigating Technological upgrading and secondary innovation in South African IT industry under the supervision of Dr Mzyece. The aim of this research project is to find out Investigate the technological learning and capability building that South African IT companies have followed beyond Multinational Corporation partnership to produce secondary innovation that solve customer problems, while challenging the multinationals by developing

solutions that meet the local customer requirements and achieve sustainable economic growth.

As part of this project, I would like to invite you and your team to take part in an interview / answering a questionnaire. This activity will involve 13 questions and will take around 60 minutes. With your permission, I would also like to audio record the interview using a digital device. This recording will be stored in a secure folder on the WBS portal and only the researcher will have access to this recording. It will be deleted after 10 years.

I am therefore requesting your permission to interview you and the knowledgeable respondents as qualified sources of information about the approach to developing and commercialising products you take to the market. The interview will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your organisation participation in my final research report. Information supplied and collected as part of this process will be used for academic purposes only. If you experience any distress or discomfort at any point in this process, we will stop the interview or resume another time.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you (optional). The data collected from this research project will be stored in WBS Ulwazi and teams' site and will be kept for 10 years. With your permission the data collected from this research project may be used by other researchers in an anonymised format. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact

the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za

Yours sincerely,

Thabitha Motau

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Appendix B Consent Form



The Graduate School of Business Administration

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Title of project Technological Upgrading and secondary innovation in South African IT industry

Name of researcher: Thabitha Motau

I, ……., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I agree that my participation will remain anonymous.	YES	NO
I agree that the researcher may use anonymous quotes in his / her research report.	YES	NO
I agree that the interview may be audio recorded.	YES	NO
I agree that the information I provide may be used in an anonymised format after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained.	YES	NO

…… (signature)

…… (name of participant)

…… (date)

…… (signature)

Thabitha Motau…… (Name of person seeking consent)

…… (date)

Appendix C: Research Instruments – Case companies

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Interview Protocol: - Case Companies

Thank you for agreeing to a meeting in such short notice. The purpose of the interview is to answer Research questions on the topic "Technological upgrading and secondary innovation in the context of the IT industry in South Africa." The special focus is your approach and commercialisation. I am delighted for your company to feature in this research.

Introductory Questions

1. Your role in the company?
2. What was the purpose of starting this brand?
3. How can you describe the businesses' success to date (i.e., a number of customers, products, profitability, recognition, and awards received, etc.)?

Addressing key Research Questions

1. How did you company enter the IT market?
2. How does your company differentiate itself from other companies in the same industry, in respect of product offerings?

3. Who are you potential customers and how do you identify them?

4. What is the process of developing and producing the products and services that your company offer to the South African customer base.

5. How do you differentiate the products offered by your company to those that are already in the market and ensure uptake and penetration by potential customers?

6. How and where does your company source the technical and business skills and expertise needed to successfully develop and commercialise your products?

7. What process does your company follow to stay relevant and successful in an industry that is dominated by Multinationals who provide a wide spectrum of services at scale and with defined business process?

8. Which are the key partners that your company engages and collaborates with as part of product and service development, sales, and marketing of your products?

9. What role has these partners played to propel your company's growth and success.

10. How do you derive the pricing mechanism for your products and services?
11. What are the next big plans for your company to achieve sustainable growth and remain relevant in South African IT Industry

Closure

12. What are your closing comments? Could you kindly suggest any other persons who might have different perspectives, to possible interview?
13. Can I contact you in future for further clarity and verification of the information gathered today?

Thank you for your time, input, and for granting this interview at short notice.

Appendix E: Research Instruments - Industry expert

Introductory Questions

1. What roles have you held in the companies you worked for?
2. What inspired you to the IT industry?
3. How can you describe the South African IT industry success to date (i.e., a number of customers, products, profitability, recognition, and awards received, etc.)?

Addressing key Research Questions

1. What is the prevailing market entry strategy that South African IT companies use to enter the market.
2. In your experience what differentiate the local companies from the multinationals, in this global market (product offering)?
3. What attributes the success of these companies, how do they ensure they are selling remain relevant and achieve sustainable growth that benefit this country?
4. How do local IT companies build technological expertise?
5. What informs the development of products they offer to the market.
6. Which key partners play a critical role in the success of these companies (Partner ecosystems)
7. How do local IT companies ensure that their products and services are offered at a competitive price point?
8. What big opportunities should the local IT companies focus on to achieve sustainable economic growth?

Closure

9. Thank you for your time, input, and for granting this interview at short notice. Can I contact you in future to clarify some of the notes and comments from this interview?