

**AN EXAMINATION INTO THE IMPACT OF E-BUSINESS
ADOPTION ON THE OPERATIONAL PERFORMANCE OF
MANUFACTURING SMES IN WINDHOEK, NAMIBIA**

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ABSTRACT

There is an abundance of literature on e-business definitions, ideas, perceptions, benefits, drivers and challenges in general. However, most of the research has focused on larger organisations and a few on SMEs with a greater bias still towards first-world SMEs. In an attempt to redress the balance of research, this paper looks at e-business with a particular focus on manufacturing SMEs in Namibia. The main objective of the study was to examine the impact of e-business adoption on the operational performance of manufacturing SMEs in Windhoek. The study used the quantitative research method with a descriptive-explanatory research design. The population was restricted to owners or managers of manufacturing SMEs in Windhoek and the sample was selected using stratified random sampling. 116 semi-structured questionnaires were successfully researcher administered, and research data captured using Microsoft Excel then exported to SPSS version 22 for descriptive and inferential data analysis.

It was found that SME and respondents' characteristics with the exception of educational level does not affect e-business adoption. Management choices, expected positive results and ICT infrastructure evolution are major drivers of e-business adoption. Firm size and stakeholder pressure are weaker drivers, while the availability of ICT skilled personnel within a firm and government support were ruled out as possible e-business adoption drivers. There is a high adoption of the general use of computers, emails, Facebook, and financial services platforms. There is low adoption of management and operations systems, online information storage and recently launched social media networks such as Twitter and Instagram. Manufacturing SMEs in Windhoek are still at the infancy stage of e-business adoption. Tested relationships yielded satisfying outcomes consistent with the way they were hypothesised.

Recommendations of the study were that more work needs to be done by various stakeholders such as the government, various ministries, academics and SMEs, to ensure effective e-business adoption and use in the future. Lastly, recommendations for future studies were also made and suggested that there should be use of mixed research methods, qualitative research, nationwide research or comparative studies across different geographical zones.

Keywords: *Manufacturing SMEs, e-business, operational performance, Windhoek*

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ACRONYMS

BoN- Bank of Namibia

CRM- customer relationship management

EDI-Electronic Data Interchange

ERP- enterprise resource planning

GDP- Gross Domestic Product

HPP- Harambee Prosperity Plan

ICT- Information and communication technology

ILO- International Labor Organisation

MITSMED -Ministry of Industrialisation, Trade and SME Development

NMA-Namibia Manufacturers' Association

NPC- National Planning Commission

OECD- The Organisation for Economic Co-operation and Development

RFID- Radio Frequency Identification

SCM- supply chain management

SEDA- Small Enterprise Development Agency

SMEs- Small and medium enterprises.

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- My entire family and friends for the love, compromise, and enormous support, I truly appreciate your efforts.

DEDICATIONS

This thesis is dedicated to my wonderful children, nieces and nephews.

I, Lee Tipton, hereby declare that this study is a true reflection of my own research and that this work or part thereof has not been submitted for a degree in any other institution of higher education.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

The age of technology brought wider changes on how business is conducted in business firms of various sizes, including Small and Medium Enterprises (SMEs). Electronic business (e-business) is among the leading technology based business practices adopted by various firms to maximise their performance. Chapter 1 introduces the reader to the entire thesis, it consists of the background to study and the problem statement, where a detailed account of the need for the study is discussed. In order to thoroughly investigate the research problem, a set of specific objectives are set to support the major objective of the study. In addition, it covers hypothesis, significance, limitations, delimitations and an outline of the study.

1.2 Background to the study

The definition of an SME varies from country to country and is based on the number of employees, the yearly turnover and balance sheet of the firm, (Abdullah, Thomas, Murphy & Plant, 2018). SMEs are defined in Namibia based on two criteria: number of employees and the annual turnover (Ministry of Industrialisation, Trade and SME Development (MITSMED), 2016). Definitions of SMEs based on the number of employees, state that micro-enterprises comprise of 1 to 10 employees, small enterprises with 11 to 30 employees and medium enterprises comprise of 31 to 100 employees (MITSMED, 2016). As much as the definition includes micro-enterprises, they are still referred to as SMEs. Even the responsible ministry are referred to as the Ministry of Industrialisation, Trade and SME Development. A detailed country to country comparison of SME definitions is provided in the next chapter. For the

purposes of this study, organisations with 1 up to 100 employees were considered for the study.

SME development is recognised as of paramount importance to governments globally (Abdullah, Thomas, Murphy and Plant, 2018; Eurostat, 2018; Majama and Magang, 2017) and specifically so for the Namibian economy (MITSMED, 2016; Shindi, 2017). The Namibian government supports SMEs through various instruments and platforms aimed at promoting SME growth and development (Harambee Prosperity Plan (HPP), 2016). SMEs play a key role in many countries' economic development and technology advancement offers them new opportunities such as conducting business electronically (Eurostat, 2018). However, there is a discrepancy between large firms and SMEs' information and communication technology (ICT) use and e-business adoption. Additionally, there is also a difference in adoption among SMEs in developing and developed countries putting the former in a disadvantaged position in the face of the global competitive business environment (Siqueira, De Souza and Barbosa, 2019). Some governments of European Union countries adopted various strategies to promote e-business adoption by SMEs. For instance, Serbia's E-business development 2014 programme and Croatian reform programme strategy of 2015 (Ilin, Ivetić, and Simić, 2017).

E-business has been adopted by business entities including SMEs in both developed and developing countries, for instance, e-business has been adopted by both large firms and SMEs in the European Union (Eurostat 2018) and (B2B) firms in Taiwan (Chang and Graham, 2012). E-business has also been adopted by SMEs in Brazil, (Siqueira, *et al*, 2019). Similarly, SMEs in India (Sharma, 2014), SME suppliers in Australia, (Abid, Rahim, and Scheepers, 2011) and SMEs in Finland and in China (Zheng, 2011)

have also adopted E-business. E-business has also been adopted in Western Balkan countries which are the less developed European Union countries such as, Serbia, Croatia, Bosnia and Herzegovina (Ilin, *et al*, 2017). In Africa, Zimbabwean SMEs have also adopted e-business strategies (Gumbo, Musungwini, Zhou, Rebanowako, and Mzikamwi, 2014) as well as SMEs in Kenya (Perks, Mutete, Pietersen and Bosch, 2010). However, as evidenced by the cited studies above, there are more e-business studies in the developed world than in the developing world, Namibia included.

E-business adoption has brought a variety of benefits to SMEs across the world. These benefits include improved operational efficiency, service quality (Ilin, *et al*, 2017) and overall business performance and efficiency (Eurostat 2018). Additionally, e-business adoption is associated with increased competitive advantage, access to wider markets, and improved distribution channels (Abid, *et al*, 2011). However, the researcher could not find any studies in Namibia to have investigated the impact of e-business adoption on operational performance.

1.3 Statement of the problem

According to the Small Enterprise Development Agency (SEDA) (2012), SMEs, especially in the manufacturing sector have been identified as crucial drivers of employment opportunities and economic development. SMEs are the majority of business firms and contribute immensely to economic diversification, employment creation, value creation and countries' GDP (OECD, 2017).

Contributions of the SME sector to employment creation differ from place to place. In Sub - Saharan Africa, it contributes 50% of the urban population, 70% in Dhaka, 50% in Zimbabwe, 80% in Addis Ababa and 65% in Indonesia, (Chigwenya &

Although SMEs are expected to grow, there is a high rate of failure or stunted growth of SMEs in developing countries (Majama and Magang, 2017; Drotsky and Okanga, 2016). For the period 2015-2016, there were over 40 000 registered SMEs in Namibia, however, 1719 of them closed down or remained stagnant despite some of them having received funding and owners or managers having gone through business training (Sheehama and Shihomeka, 2017). Regarding the failure of SMEs in Namibia, previous research focused much on general factors such as limited financing, shallow production and limited access to markets (Sheehama & Shihomeka, 2017; Shindi, 2018). No studies in Namibia could be found to have investigated the impact of ICT on SMEs' performance, growth and development.

There has been enormous progress in ICT everywhere around the globe in the previous years, leading to countless prospects. Sife, Kiondo, and Lyimo-Macha (2010) states that 'ICTs have penetrated virtually every segment of society and projections suggest increased penetration rates'. The Internet and information technology revolution went through three main stages: innovation, institutional and commercialisation phases with the latter phase bringing concepts such as e-business and its numerous opportunities to SMEs (Perks, *et al*, 2010). Ilin, *et al* (2017), after their study in Western Balkan countries, concluded that firms with certain perceived relative advantages, top management support, government resource support and government regulatory support are more likely to adopt e-business. The government of Namibia acknowledges the broad contribution of ICT to economic development and to SMEs' performance and growth (MITSMED, 2016). Thus, the importance of e-business adoption for the economic success and survival of SMEs creates a very interesting field of research, which has been lacking in Namibia.

The government, in its national policy document for SMEs appealed for various stakeholders to participate in researches on innovation and technology ideal for SMEs (MITSMED, 2016). This indicates a gap on the available research in Namibia on SMEs and ICT in general and e-business in particular. E-business adoption studies increased in the year 2000 with most of them focused on developed countries, yet e-business adoption is a worldwide and multidiscipline topic. With the advancement of new technologies, it needs timely constant research (Chen and Hollsopple, 2013). The gap in knowledge and literature on e-business adoption within the SME sector in developing countries motivated the undertaking of this study. It is therefore, imperative to determine the current adoption of e-business and factors influencing the adoption of e-business strategies. This research takes the form of a survey research with the purpose of examining the adoption of e-business strategies and its impact on operational performance by SMEs in Windhoek.

1.4 Study objectives

The main objective of the study was to examine the impact of e-business adoption on the operational performance of manufacturing SMEs in Windhoek. The specific objectives were:

- To determine e-business technologies adopted by manufacturing SMEs in Windhoek.
- To determine the level of e-business adoption by manufacturing SMEs in Windhoek.
- To identify major drivers of e-business adoption by manufacturing SMEs in Windhoek.

- To examine the relationship between e-business adoption and operational performance for manufacturing SMEs in Windhoek.

1.5 Hypothesis

H₀: There is no positive relationship between e-business adoption and operational performance.

H₁: There is a positive relationship between e-business adoption and operational performance.

1.6 Significance of the study

The major importance of this research is its contribution to the fields of research and practice of ICT, particularly on e-business and SMEs. This study provides relevant and current information regarding e-business adoption; this may help theoretical and practical beneficiaries. SMEs' significant contribution to employment creation, poverty eradication, overall Namibia economic growth and e-business adoption opportunities to businesses is irrefutable, hence the study may practically benefit various stakeholders. The study also adds to the scarce relevant literature regarding the adoption of e-business in developing countries and Namibia in particular. Furthermore, as no studies could be found to have investigated e-business in the Namibian context, this study set out the path for future research in the country regarding e-business.

One of the objectives of the study is to identify major drivers of e-business adoption by manufacturing SMEs, hence the findings may be used by regulators and policymakers to develop and shape the ICT policy. The government of Namibia and

related bodies may use the findings to shape skills development programmes, policies, and infrastructure development that allow e-business adoption by SMEs. The findings and suggestions of this study should contribute significantly towards SME owners and managers giving them more understanding of e-business, hence improve decision making and improve SMEs' effectiveness. The findings may also lead to effective operational efficiency and subsequently the development of SMEs in Namibia.

1.7 Limitations of the study

The study used only voluntary non-paid SME owners and/or managers. The researcher further faced unwillingness to answer certain questions because of fear of leaking their critical information to competition. The researcher managed to overcome this by giving the respondents assurance that their information was well protected and used exclusively for academic research purposes and never to be shared by third parties. In addition, the respondents were given a copy of the research clearance letter from the university. Due to the busy schedules of the respondents, it was not easy to get them to respond to the questionnaires on time. The researcher extended time by two more weeks from the intended time frame and later on utilised the available filled in questionnaires after the time extension lapsed.

1.8 Delimitation of the study

The study was delimited to owners and/or managers from SMEs meeting various preset conditions. Firstly, SMEs had to be formally registered with The Ministry of Trade, Industrialisation and SME Development as well as in the manufacturing sector. Furthermore, manufacturing SMEs were supposed to be recorded in a publicly accessible list by The Namibia Manufacturers' Association (NMA). Hence, the

research was confined to manufacturing SMEs within the Windhoek geographical area and on the NMA 2016 list.

1.9 Outline of the study

Chapter One: Introduction

This chapter outlines the background to study and the research problem that prompted the research study. It further outlines the significance, objectives, limitations and delimitations and of the study.

Chapter Two: Literature review

This chapter gives an evaluation of available secondary data related to the research problem. It provides definitions of key terms and concepts such as e-business and SMEs. It also outlines a review of crucial literature such as e-business technologies, e-business adoption, drivers and benefits of e-business adoption and e-business theoretical framework.

Chapter Three: Research methodology

Research methodology chapter describes the techniques used to conduct the research. It outlines the research approach and design, population and sample of the study, research instrument, data collection and analysis procedures.

Chapter Four: Research findings

This chapter reports on the results of the study integrating existing available literature whenever possible. The research findings are presented using tables and figures as well as descriptive and inferential statistics.

Chapter Five: Discussions, conclusions, and recommendations

This chapter discusses the research results in greater depth and outlines recommendations to various stakeholders based on the research findings and conclusions. Lastly, the chapter outlines suggestions for future studies in the field of e-business.

1.10 Summary

In conclusion, this chapter introduces the research topic, giving the basis of the research problem. It also outlines objectives, hypothesis, significance, delimitations, and limitations of the study. Lastly, it outlines the summary of what is covered in each of the five chapters of the thesis. The next chapter focuses on reviewing appropriate available literature.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This second chapter of the study reviews the secondary data available from previous research and writers across the world. The literature review discusses varying definitions of key terms such as SME and e-business definitions. In addition, the chapter focuses on secondary data about e-business technologies and adoption, drivers of e-business adoption and operational performance. Lastly, it discusses a variety of e-business adoption theoretical frameworks and the best theoretical framework for this study.

2.2 SME definition

A study conducted by the International Labor Organisation (ILO) in more than 75 countries, identified more than 50 definitions of SMEs, hence there is no universal definition of SMEs (Sharma, 2014). The Organisation for Economic Co-operation and Development (OECD) (2017) argues that SME definitions vary across countries because the dimensions of small and medium of a firm are not universal, but relative to the size of the domestic economy. The basis of the SME definition also varies from one country to another. For instance, in India the definition of an SME is based on plant and machinery value (Sharma, 2014). In Yemen, it is based on the number of employees (Abdullah, *et al*, 2018) and in European countries, it is based on annual turnover and number of employees (OECD, 2017). While South Africa's definition of an SME is based on the number of employees, annual turnover and assets owned, (Mahembe, 2011), Namibia's definition excludes the latter (MITSMED, 2016).

Other countries such as Bangladesh, Japan, and India define SMEs differently depending on the industry (Syed and Shaikh, 2012; Sharma, 2014). India defines SMEs in the manufacturing sector as micro-enterprises which do not exceed twenty-five lakh rupees; small enterprises having more than twenty-five lakh rupees, but not exceeding five crore rupees and medium enterprises as those have more than five crore rupees but not exceeding ten crore rupees (Sharma, 2014). Bangladesh and Japan define SMEs based on different industries, and this is summarised in Table 2.1 below:

Table 2.1: Bangladesh and Japan SMEs definition

Japan	Categories of Industries	Employee size
	Manufacturing	300 or less
	Wholesale	100 or less
	Retail and Services	50 or less
Bangladesh	Manufacturing	60 or less
	Trading	20 or less
	Service	30 or less

Source: Syed and Shaikh, 2012

OECD (2017) refers to SMEs as the firms employing up to 249 individuals, with the following breakdown: micro (1 to 9), small (10 to 49) and medium (50-249). In Yemen, SMEs are similarly defined based on the number of employees, in which case micro-enterprises comprising of less than 4 employees, small-sized enterprises firms with employees between four and nine and medium-sized enterprises comprising of employees between 10 and 50 employees (Abdullah, *et al.*, 2018). SMEs are defined in a similar way based on the number of employees in South Africa in addition to

turnover and assets owned basis as summarised in Table 2.2 below. Mahembe (2011) states that in South Africa SMEs encompass of small-enterprises characterised by less than 50 employees and/or less than R2m to R25m in annual turn depending on the industry and/or gross assets of less than R2m to R4.5m while the medium-enterprises are larger in every feature reference Table 2.2.

Table 2.2: SMEs South Africa's definition

ENTERPRISE SIZE	NUMBER OF EMPLOYEES	ANNUAL TURNOVER	GROSS ASSETS (EXCLUDING FIXED PROPERTY)
Small	Fewer than 50	Less than R2m to R25m depending on the industry	Less than R2m to R4.5m depending on the industry
Medium	Fewer than 100 to 200, depending on the industry	Less than R4m to R50m depending on the industry	Less than R2m to R18m depending on the industry

Source: (Mahembe, 2011, p 25)

Namibia's definition of SMEs is further divided into three categories namely: micro, small and medium and defined based on the number of employees and turnover (MITSMED, 2016) see reference Table 2.3 below. SMEs are defined in Namibia based on annual turnover as follows: N\$0 to N\$300000 for micro-enterprises, N\$300001 to N\$3 million for small-sized enterprises and N\$3000001 to N\$10million for medium-enterprises. Table 2.3 divulges that in Namibia the micro-enterprises are made up of 1 to 10 employees, followed by small-sized enterprises consisting of 11 to 30 employees and the largest category namely: medium-enterprises consisting of 31 to

100 employees. The use of number of employees in the Namibian SMEs definition is similar to a few other countries such as Yemen, the European Union countries and South Africa. However, these definitions are not identical to the specific number of employees. For instance, SMEs in Namibia should have up to 100 employees, Yemen up to 50 employees, South Africa up to 200 employees and European Union countries with the highest number of 250. These differences can be attributed to the variances in each country's economic size. For the purposes of this study, SMEs in Namibia are defined based on the number of employees.

Table 2.3: SMEs Namibia definition

Categories	Number of full-time employees	And/or	Annual turnover N\$
Micro-enterprises	1-10 employees	And/or	0 to 300,000
Small-enterprises	11-30 employees	And/or	300,001 to 3,000,000
Medium-enterprises	31-100 employees	And/or	3,000,001 to 10,000,000

Source: MITSMED, 2016

2.3 E-business definition

Some writers argue that e-business and e-commerce can be used interchangeably (Chang and Dasgupta, 2015; Ilin, *et al*, 2017). While others argue that e-commerce is a subset of e-business as it encompasses only buying and selling of goods and/or services over the internet (Zott, Amit, and Massa, 2011). Turban, King, Lee, Liang and Turban (2015), state that e-commerce in its strict definition is buying and selling of goods via the internet making it part of e-business. However, when defined in its

broadest sense, which is more than just buying and selling, then can it be used interchangeably with e-business. For the purposes of this thesis e-commerce is defined as buying, selling or transferring goods and services using the internet and intranet, hence it is used in its basic form as part of e-business.

2.4 E-business technologies

Airball (2010) stated that e-business technologies adopted by organisations include:

On the one hand, e-business is said to be the use of computers to enhance internal and external business processes with or without access to the internet (Eurostat, 2015). On the other hand, Gumbo, *et al*, (2014) argue that e-business is conducting a spectrum of business functions using online enabled applications over the internet. Zott, *et al*, (2011) define e-business as doing business online, which encompasses e-commerce, e-markets and internet-based business. Emphasising also the inclusion of the internet in e-business definition are Chang and Dasgupta, (2015) defining e-business as where business transactions are conducted remotely using the internet. Perks, *et al* (2010) argue that e-business is sharing information easily, using technologies such as the internet, Electronic Data Interchange (EDI), and cellular technologies. The major difference among the above e-business definitions is inclusion or exclusion of the internet. However, there is a general agreement on e-business being conducting a variety of business processes using ICT infrastructure.

There is no universal standard definition of e-business with some definitions distinguished on the basis of the use of the internet or not. From the reviewed literature, e-business is not limited to buying and selling products and services online, but includes customer services, collaborating with business suppliers and partners as well as making transactions electronically within the organisation. The definitions differ on the extent of e-business despite general agreement that it is more than just buying and selling of products and services electronically. Conclusively, for the

purposes of this study, e-business is the use of ICT and all related technologies in conducting internal and external business activities.

2.4 E-business technologies

Aithal (2016) stated that e-business technologies adopted by manufacturers comprise of using the internet and the web from design, procurement, production to distribution of physical goods. E-business encompasses e-commerce, e-markets and any internet-based business practices (Zott, Amit, *et al*, 2011). In 2015, the European Union identified e-business technologies to constitute the use of computers without the internet, access to the internet, use of websites, enterprise resource planning (ERP) and customer relationship management (CRM) (Eurostat Statistics, 2015). In 2018, European Union described e-business to consist of emails, websites (Eurostat, 2018a) and ERP, CRM, supply chain management (SCM) and Radio frequency identification (RFID) (Eurostat, 2018b). Eurostat (2018b) states that RFID is whereby technologies are used for person identification, access control or product identification and tracking. Research also identified the following as the most recent additions to the traditional e-business categories: social media, cloud services and mobile applications (Abdullah, *et al*, 2018).

Researchers have categorised e-business techniques differently: on the one hand, there are three categories (Syed and Shaikh, 2012) namely: e-commerce, business processes, and external partnerships. On the other hand, other researchers have five categories which are internal computer use, internal computer and internet use, payment system, social media and online interaction with other stakeholders such as the government, banks, suppliers and customers (Gumbo, *et al*, 2014). Zott, Amit *et al*, (2011) categorised e-business groups to comprise of e-commerce, e-markets and any internet-

based business practices. Shaikh, Rafiq and Iye (2014) categorised e-business based on management roles and activities, namely electronic data interchange (EDI), e-commerce, electronic customer relationship management (e-CRM), electronic enterprise resource planning (e-ERP), electronic supply chain management (e-SCM), and electronic human resource management (e-HRM).

For the purposes of this study, most common e-business technologies are adopted and adapted from reviewed literature. They are as follows: internal computer systems with no internet access (Gumbo, *et al* 2014; Eurostat statistics, 2015; Eurostat, 2018b), emails (Eurostat, 2018a; Abdullah, *et al*, 2018; Eurostat statistics, 2015) and websites (Eurostat, 2018a; Gumbo, *et al*, 2014; Abdullah, *et al*, 2018; Eurostat statistics, 2015). In addition, social media platforms and payment systems where the former consists of Facebook, WhatsApp, Twitter and Instagram, and the latter consists of internet banking and mobile banking (Gumbo, *et al*, 2014; Abdullah, *et al*, 2018).

2.5 E-business Adoption

E-business adoption and general IT use among SMEs is not the same from one country to another, but it varies among different countries (Ilin, Ivetić, & Simić, 2017). This is also supported by various writers as evidenced below from several research reports. For the period 2014-2017 the use of websites was very high from 74% to 77% while high order e-business practices such as ERP, CRM, SCM, and RFID had lower penetration among EU enterprises with usages of 34%, 32%, 18% and 12% respectively (Eurostat, 2018). Similarly, country-wide researches among OECD countries concluded that there is a high adoption rate of internet connectivity and web presence while high-end e-business tools such as ERP and cloud computing are adopted by less than 20% of SMEs (OECD, 2017). From a sample of 80 Gweru based

SMEs, above 80% adopted basic e-business techniques namely computer system, internet connections, websites and electronic payment and 70% used social networking (Gumbo, *et al*, 2014).

A nationwide 2013 study in Palestine revealed that e-business and e-commerce are still developing among SMEs with only 11.3% using e-commerce and 0.2% using banking and financial e-business services (Abualrob and Kang, 2016). In a study conducted in 2011, the majority of SMEs in Malaysia were on e-mail and web presence stages and less than 15 percent had reached higher e-business techniques, (Mohamad & Ismail, 2011). The majority of SMEs in Yemeni are still at the infancy stages of e-business adoption, (Abdullah, *et al*, 2018). From the reviewed literature above, the trend of high adoption of low-end e-business categories is common although the percentages of adoptions seem to be affected by the sample sizes and varying from county to country. In small sample sizes, there is high adopters' percentages than in large sample size. In addition, there is also higher penetration of high-end e-business practices in the developed world than in the developing world and most of the researches in the developing world used small populations and sample sizes. In this non-country wide study, a relatively small sample of 132 was used, setting precedent for future countrywide studies.

2.6 E-Business adoption in Namibia

According to Reginald and Millicent (2014), the current business environment is characterised by ever-changing technologies hence SMEs should be able to adapt and adopt necessary changes. According to a 2014 survey conducted by the World Bank on enterprises in Namibia, a minimal number of SMEs were found to be using some form of ICT. In most cases, the technology adopted mismatched the needs of the

organisation (MITSMED, 2016). The responsible ministry acknowledges that there are insufficient researchs on SMEs and ICT use and encourages more research to be conducted to allow informed decision making (MITSMED, 2017). This further justifies the need for the current study as it fills in a crucial gap in the research space, with MITSMED entreaty to academics, scholars, and researchers at large. The government through national policy and strategic framework for SMEs states that there is a need for innovation and technology development, adoption and adaptation among Namibia SMEs (MITSMED, 2016; MITSMED, 2017). No literature could be found to be specific for e-business adoption among SMEs in Namibia.

2.7 E-business benefits

ICT, in general, has been proved by previous research to be of great benefit to businesses. For instance, ICT can directly or indirectly increase productivity with varying degrees depending on the organisation although sometimes it can take longer to see the results (Brynjolfsson, Rock and Syverson, 2018). E-business adoption among SMEs results in improvements in any of the following decision-making process, information management, customer service, order and sales management and lower operating expenses (Ang and Husain, 2012). In the European Union, SMEs' e-business adoption resulted in improved revenue income, (Eurostat, 2018). In the same vein, Ang and Husain (2012) also state that e-business adoption improvements in efficiency ultimately leads to business income increase.

E-business allows business functions such as marketing, human resources, finance, information technology, and general management to be executed over the internet providing convenience and efficiency in business operations (Gumbo *et al.*, 2014). As a result of e-business adoption, SMEs are able to improve operational efficiency and

service quality (Ilin, *et al*, 2017). E-business techniques use has ripple effect when they break down distance barriers enabling businesses to reach distant markets without having a physical existence. This leads to a reduced cost of buying and selling goods and services (Chang and Dasgupta, 2015; Ang and Husain, 2012).

E-business adoption can also reduce the cost of business transactions and also increase flexibility in communication with business partners, improve distribution channels, improve customer service among other benefits (Jabeur, Mohiuddin and Karuranga, 2013). Chang and Graham (2012) argue that cost reduction is the greatest benefit of e-business adoption which is necessitated by the implementation of e-commerce systems, creation of strategic relationships with stakeholders and collaboration in new product development reducing cycle times on the supply chain.

Syed and Shaikh, (2012) conclude that e-business adoption reduces transaction costs, reduces distribution channels, allows getting instant feedback from customers, resulting in faster production hence positively improving SMEs' operating performance. E-business improves firm performance by reducing cycle time, improve client service, reduce procurement expenses, improve products or services and improve internal processes (Oliveira and Martins, 2010). This is in support of the above-mentioned writers regarding e-business increasing operating performance. Thus, SMEs adopt e-business strategies differently, gaining diverse benefits across geographical horizons. This brought about the need to investigate the extent of e-business adoption in Namibia.

2.8 E-business drivers

One study conducted the beginning of the decade on telecommunication and the tourism industries in the European Union countries concluded that perceived e-

business benefits, technology readiness, competitive pressure and trading partner collaboration are the major e-business drivers (Oliveira and Martins 2010). Research that immediately followed also identified prospective benefits, pressure from competitors and the need to collaborate with stakeholders as the driving force behind e-business adoption (Jabeur, Mohiuddin and Karuranga, 2013; Sharma, 2014). Perceived advantage is also identified as a key e-business driver in one of the studies (Ilin, *et al*, 2017).

According to Chang and Dasgupta, (2015), the disruptive nature of e-business is the greatest driver and SME owner or manager's IT skills and knowledge as well as availability of other IT/ICT skilled personnel can drive or prevent e-business adoption by SMEs. Supporting the same view are Ilin, *et al*, (2017) who concluded that. The lack of the availability of IT knowledge of using e-business is related to the adoption of e-business where lack of inhibit e-business adoption and availability drives e-business adoption.

Furthermore, firms with certain perceived relative advantages, top management support, government resource support, and government regulatory support are more likely to adopt e-business (Ilin, *et al*, 2017). Alam (2009) argues that generally, highly educated business executives are more flexible and hence more likely to adopt new technologies as they are open to change than their less educated counterparts. Salazar, Wang and Oswald, (2011) also states that there is a positive relationship between business decision-makers' knowledge and e-business adoption.

E-business adoption drivers vary also across geographical and industrial divides. For instance, in India e-business is influenced by the nature of the business, prospects of positive outcomes, ability to handle change and pressure from stakeholders, (Sharma,

2014). In the context of Greece, firm size and scope, information technology infrastructure and internet skills are the most important drivers of e-business adoption (Chatzoglou and Chatzoudes, 2016). In their study in Canada among forestry SMEs Jabeur, Mohiuddin and Karuranga (2013) identified the age of the firm, exportation, firm size, geographical location, perceived financial and client benefits and industry group as key drivers of e-business adoption.

Additionally, on the geographical divide, Chang and Graham (2012), after their study in Taiwan, found that SMEs lack skills and resources to adopt e-business on a similar scale as large corporate and encouraged the government to provide supportive infrastructure, legislation, funds, industry policies and regulatory frameworks that drive e-business adoption by SMEs. Low technology penetration among SMEs, lack of qualified personnel and lack of finance, computer software, and hardware resources are major barriers in Yemeni while, where these are available are drivers of e-business adoption, (Abdulla *et al.*, 2018).

Ilin, *et al* (2017) categorise e-business drivers into three broad categories, the characteristics of the innovation, organisational characteristics made up of firm size plus top management support and lastly industry context such as government interventions and industry pressure. Although, some scholars argue that e-business adoption drivers are more related to the nature of business than country specific (Olivera and Martin, 2010). However, there is evidence supporting that factors which influence e-business adoption are country-specific (Ilin, *et al*, 2017; Chatzoglou and Chatzoudes, 2016; Sharma, 2014), and this justifies the need to identify e-business

adoption in the context of manufacturing SMEs Namibia since literature on this regard is largely limited.

Earlier research in the last decade also focused on drivers mostly from within the organisation (Oliveira and Martins 2010, Jabeur, *et al*, 2013; Sharma, 2014). Meanwhile, the most recent researchs found diversified e-business adoption drivers which includes any of the following factors, internal factors, micro and macro environment factors (Chatzoglou and Chatzoudes, 2016;*et al*, 2017; Abdulla *et al*, 2018). A study by Deloitte Center identified the following global environment factors as drivers of high-tech SMEs, increase in productivity over the last 45 years, costs decrease of the digital technology, digital information storage and data transfer rate, coupled with enabling environment such as significant rise of the internet penetration rate, advancement in information infrastructure and billions of smartphones, tablets, laptops (Antoniuk, Gernego, Dyba, Polishchuk, and Sybirianska 2017).

Previous studies in this section were used to select the most likely influential factors that could drive the adoption of e-business in Windhoek. For the purposes of this study, the most popular drivers based on literature were adopted as basis for the primary study investigation, these includes top management characteristics such as age, skills, knowledge and general top management choice to adopt or not to (Ilin, *et al*, 2017; Sharma, 2014; Chang and Dasgupta, 2015). Firm features such as firm size, nature of business and age of the business may be also found to be a major e-business driver (Chatzoglou and Chatzoudes, 2016; Sharma, 2014; Chang and Graham, 2012). Additionally, expected positive results is also a major e-business driver as it is supported by a number of researchers over the years (Oliveira and Martin, 2010; Chang and Graham, 2012; Jabeur, *et al*, 2013; Chang and Dasgupta, 2015; Ilin, *et al*, 2017).

Availability of enabling ICT infrastructure is also a popular e-business driver among previous researches (Chatzoglou and Chatzoudes, 2016; Abdullah *et al*, 2018; Chang and Graham, 2012; Antoniuk *et al*, 2017). Other major e-business drivers are stakeholder pressure (Olivera & Martin, 2010; Sharma, 2014; Jabeur, *et al*, 2013) and government interventions (Ilin, *et al*, 2017; Chang and Graham, 2012).

2.9 E-business adoption and SME operational performance

Nigeria's parliamentarians recognised advancement of SMEs' business performance through innovation and technology adoption as the ultimate way to realize an overall economic improvement, (Eniola, Entebang and Sakariyau, 2015). Bayo-Moriones, Billon and Lera-Lopez (2013) also acknowledged the positive impact of ICT adoption on SMEs' overall business performance and argued that it is because of a chain reaction ICT triggering communication enhancement which leads to improvement in operational performance and ultimately overall business performance.

Tarutè and Gatautis, (2014) identified operational and financial performance as two major classifications under business performance. Previous researchs focused on or included the financial performance of Namibia SMEs from numerous perspectives (Ogbokor and Ngeendepi, 2012; Nzitunga, 2009; Sheehama, and Shihomeka, 2017; Shindi, 2018). However, none could be found to have focused on SMEs' operational performance. Hence, this study focuses on the relationship between operational performance and e-business adoption on manufacturing SMEs based in Windhoek.

Business operational performance is defined as the effectiveness and efficiency of an organisation to accomplish its objectives and the degree the firm can exceed stakeholders' expectations (Maziriri and Chinomona, 2016). Tarutè and Gatautis, (2014) on their study on effects of ICT in general and SMEs performance argued that

SMEs operational performance include dimensions that measure not only changes in economic activities, but satisfaction and others. Therefore, they classified the dimensions of operational performance as customer satisfaction, employee's satisfaction, environmental performance and social performance (Tarutė and Gatautis, 2014). Chung (2013) after a study on the relationship between e-business and operational performance in Taiwan's SMEs, concluded that operational performance is measured using the following, profit capacity, sales growth rate, product and service quality, customer retention, success rate of new product launch, operational cost, and overall operational efficiency.

Research on manufacturing firms had the following as most significant: operational performance measures cost, speed, dependability, quality, and flexibility (Belekoukias, Garza-Reyes and Kumar (2014). Similar to the previous set of measures are; productivity growth, cost reduction, new product development, services and processes, quality improvement in products and services and increased speed in product delivery (Bayo-Moriones, *et al*, 2013).

For this study, operational performance measures were adopted from reviewed literature included human retention measures such as improved customer retention (Chung, 2013; Tarutė and Gatautis, 2014) and low employee turnover (Tarutė and Gatautis, 2014). In addition, operational performance metrics included productivity growth (Bayo-Moriones, *et al*, 2013) and improved speed and flexibility of doing business (Chung, 2013; Bayo-Moriones, *et al*, 2013; Belekoukias, *et al*, 2014). Others focused on financial measures, these are revenue growth (Chung, 2013; Belekoukias, *et al*, 2014) and reduced operational costs (Chung, 2013); Bayo-Moriones, *et al*, 2013; Belekoukias, *et al*, 2014).

However, Mehmet and Emre, (2012) states that companies are hesitant to share their specific statistics, especially financial related. To overcome this challenge researchers suggested adopting indirect approaches during data collection (Mehmet and Emre, 2012; Bayo-Moriones, *et al*, 2013). Mehmet and Emre, (2012) suggested instead of requesting specific figures about a firm rather ask questions such as “how good” is the company in terms of various measures. Bayo-Moriones, *et al* (2013) asked managers to assess on a scale of zero (no effect) to ten (very significant effect) to what extent they considered that specific ICTs including e-business use had allowed their companies to reach various performance-related goals. It is in considerations of these views that the Likert scales were used in the data collection instrument.

Researchers such as Ang and Husain, (2012), Abdulla *et al* (2018) and Chang and Graham (2012) researched e-business as an independent variable. Bayo-Moriones, *et al* (2013); Maziriri and Chinomona (2016); Vieira (2010), Chung (2013), Mehmet and Emre (2012) in their studies measured business operational performance as a dependent variable. Likewise, in this research e-business adoption is the independent variable, while operational performance is the dependent variable.

There is no one best way to investigate these variables as the following different researchers used different research methods such as quantitative survey (Ilin, *et al*, 2017), mixed method (Abdulla *et al.*, 2018) and qualitative research (Sharma, 2014). This study used a quantitative research method as this fits the purpose of the study. The research objectives seek to obtain a conclusive description regarding the level of e-business adoption, in addition, to examine the driving forces behind e-business adoption and the relationship between e-business adoption and operational performance among manufacturing SMEs in Namibia. Quantitative research is

objective in nature seeks hard facts through statistics (Bradley, 2013) hence it is the most ideal for this study.

2.10 Theoretical framework

Chen and Hollsopple, (2013) concluded that technology adoption models are used in the assessment of e-business adoption because they are related, except that the latter entails technology adoption with other management functions. Early studies were pursued to understand the notion of technology adoption behaviour from a psychological perspective (Aldwsry, 2012; Chen and Hollsopple, 2013). Psychologists postulated Theory of Reasoned Action (TRA) in which an individual's behavioural intention to adopt ICT or not was subjective to the individual's perceptions of the social pressures (Ajzen and Fishbein, 1980; Davis, 1985).

Later on, TRA was modified to the technology acceptance model (TAM), which articulated to measure an individual's attitude towards new technology in order to accept it where the choice is influenced by the perceived usefulness and perceived ease of use of the new technology (Davis, 1989). Perceived usefulness is measured by the extent to which individuals within an organisation believe that using specific technology improves the work environment, whereas perceived ease of use is measured by the extent to which the individuals within an organisation believe that using specific technology would be effortless (Davis, 1989).

TAM, however, failed to explain sufficiently information regarding adopters' opinions about technology and this gave birth to revised TAM models TAM 2 (Venkatesh and Davis, 2000) and TAM 3 (Venkatesh & Bala, 2008). In 2003, the unified theory of

acceptance and use of technology (UTAUT) was developed and it postulated the following four factors in determining an individual's perception on technology, performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh, Morris, Davis and Davis, 2003).

While Ajzen and Fishbein (1980); Davis (1985) were studying technology from the psychological perspective, Rogers (1983) was studying from a marketing perspective and postulated the Diffusion of Innovation (DOI). DOI theory aimed to understand the process of diffusion of innovative technologies by individuals and persons within a specific firm, as impacted by the individual, the technology itself, organisational and environmental perspectives (Rogers, 1983). Tornatzky, Fleischer, and Chakrabarti (1990) also came up with a theory that considered the internal and external factors that affect the assimilation process named The Technology–Organisation–Environment Framework (TOE).

The TOE framework in addition to considering internal and external factors affecting technology assimilation can also be modified to suit the research context, hence may be more comprehensive than intention-based models, such as TAM and diffusion innovation theory. Although the TOE framework suggested examination of technology adoption and assimilation from multifaceted perspectives, it still failed to capture certain considerations such as management influences and innovation characteristics (Aldwsry, 2012).

Terms such as assimilation, implementation, diffusion, acceptance, readiness, intention to use, and actual usage are mostly used in e-business adoption. Many studies could be found to have used TOE or DOI frameworks in e-business studies (Chang, 2010; Chatzoglou and Chatzoudes, 2016; Oliveira and Martins, 2010; Ilin, *et al*, 2017).

The TOE framework and DOI theory could be found to be the most frequently used frameworks in the studies on e-business adoption (Abualrob and Kang, 2016; Chang, 2010; Chatzoglou and Chatzoudes, 2016; Oliveira and Martins, 2010; Ilin, Ivetić, *et al*, 2017).

Overall, each theory and model has its weaknesses and limitations. For example, the technology adoption models have their concentration on individual level rather than the organisation they work for. On the other hand, the TOE framework is less focused on technology features than well-established technological adoption models. Therefore, to overcome such limitations, previous studies tended to incorporate different models and theories to build new multi-perspective frameworks. Both these frequently used theories have their disadvantages hence the researcher used a framework developed and adapted from the two theories where they complemented each other's shortcomings. E-business assimilation framework which is a combination of innovation attributes from the DOI and contextual factors from the TOE framework (Zhu, Kraemer and Xu, 2006; Chen and Hollsopple, 2013) was used for this study.

E-business assimilation/diffusion model has three stages namely initiation, adoption and routinisation as illustrated in Figure 2.1 below, where initiation is about readiness, adoption is about acceptance and routinization is about implementation and actual usage (Chen and Hollsopple, 2013). E-business readiness is about evaluating possible e-business adoption benefits e-business and whether an organisation or individual is ready to facilitate e-business; e-business adoption or acceptance focus e-business on making decisions to use e-business and usage and implementation focus on measuring e-business success (Zhu, Kraemer and Xu, 2006; Chen and Hollsopple, 2013).

This study is premised on the e-business assimilation model because organisations face different e-business benefits that are e-business adoption drivers, adopt diverse e-business technologies resultantly reaping different e-business success results. In this study, the success focuses on business operating performance. The study used the term acceptance instead of adoption although they are used interchangeably, just for clarity as the entire three stages are about e-business adoption. The model explains different organisations' abilities to practice e-business differently and gaining different benefits.

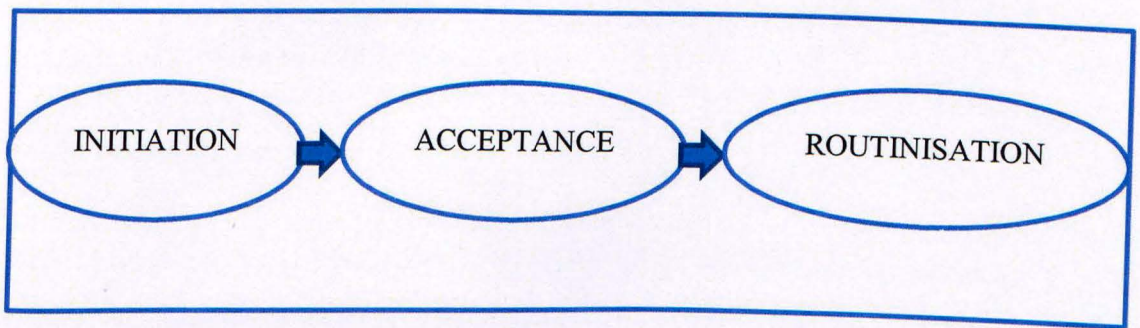


Figure 2.1: E-Business Assimilation/Diffusion

Source: Chen and Hollsopple (2013)

In line with the research objectives, the following modifications were made: Under the initiation stage, the researcher focused on drivers of e-business adoption; under the acceptance stage, the researcher focused on adopted e-business techniques and under routinisation, focused on operational performance. This study used the e-business assimilation framework because business firms face different e-business adoption drivers, adopt diverse e-business technologies and reap different benefits. This paved the way for the need to assess the relationship between e-business adoption and business operational performance as they are key pillars of the model.

2.11 Summary

The chapter reviewed secondary data from Namibia, Africa and the rest of the world. This chapter looked at various bases for defining SMEs and their economic contributions across the world. It also looked at e-business definitions, adoption, technologies, drivers, benefits and adoption models. The following chapter outlines the research methodology used for this study.

3.1 Research design

The study used a quantitative research method but followed a descriptive-explanatory design. Quantitative research is objective in nature and deals with facts through statistics (Bradley, 2013). The Causal-comparative approach was the basis for analyzing various relationships between statistically measured variables. Mubanga (2016) defines descriptive research as an empirical research that aims to describe something and can be conducted using the survey method. Explanatory research seeks to explain why something is the way it is (Akmal, 2016).

The descriptive nature of the research, that of the researcher to describe respondents and their characteristics and firms' adoption levels of e-business. The explanatory aspect allowed the researcher to explore the difference between the relationships between the variables and business operational performance and various statistical relationships. Mubanga (2016) notes that a survey method uses a questionnaire designed to elicit specific information from respondents. Hence the survey method was chosen to be a method fit for the research purpose.

The choice of research method and design fits the purpose because the research objectives of this study were to obtain a conclusive description regarding the level of e-business adoption and examining the driving forces behind e-business adoption in Namibia. Of vital significance in this study is to avail conclusive information that could be used by important economic decision-makers such as SME owners and /or managers and various state bodies, hence the research design fits the purpose.

The current study used the e-business assimilation framework as already discussed in Chapter 2. This model is ideal for the study because business firms and people in the highest authority at these firms face different circumstances prior to e-business adoption. In addition, firms adopt diverse e-business technologies and reap different benefits. This paved the way for the need to assess the relationship between e-business adoption and business operational performance as measuring e-business adoption outcomes is a key pillar of this model.

3.3 Population

The Namibian Manufacturers' Association (NMA) (2016) stated that there are 218 manufacturing SMEs registered with the MITSMED in Windhoek. The 218 manufacturing SMEs were made up of seven sub-groups namely: metals (42), non-metallic minerals (25), chemicals (25), food and beverages (46), paper and plastics (16), leather and textiles (28) and wood (36). To qualify for the study, a manufacturing SME must have been operating for at least two years which is beyond the startup phase. All of the 218 manufacturing SMEs were at least two years in the manufacturing business hence the population is 218 manufacturing SME owners and/or managers.

3.4 Sample

According to Bradley (2013), the sample size for any study is determined by the size of the population, required precision, study duration, budget and resources. The sample size was calculated to match the size of the population and required precision using this formula $n = (Z\alpha/2)^2 p(1-p)N / (Z\alpha/2)^2 p(1-p) + (N-1)Cp^2$ (Israel, 1992 in Okello-Obura, Kacunguzi and Kidaaga, 2015). In applying this formula N is the population, $Z\alpha = 1.96$ (from z-table), p the proportion and highest possible sample is achieved at $p=0.5$ and Cp is the desired level of precision or tolerant error and this study used 5 percent. According to the population (N) of 218 and precision, the sample size (n) was 132.

Stratified random sampling which is a probability sampling technique was used based on seven major sub-manufacturing groups. Wilson (2014) states that probability sampling techniques provide each population element an equal chance of being selected, hence minimum bias in statistical analysis. The size of each stratum was calculated using a simple proportion. The strata sizes and names are metals (25), non-metallic minerals (15), chemicals (15), food and beverages (27), paper and plastics (10), leather and textiles (17) and wood (22). Participants were then randomly selected from each manufacturing stratum to make up the sample.

3.5 Research instrument

A questionnaire has limited alternatives, therefore, reduces inconsistency in results, making the data collected more reliable (Malhotra,2010), hence the use of a questionnaire in this study. A semi-structured questionnaire comprising of four sections was developed and used for data collection. The questions were structured to capture data relevant to the research objectives stated in Chapter 1 earlier. Section A

focused on SME owner/manager biographical and personal data and business characteristics. Section B concentrated on the adoption of e-business technologies while section C focused on drivers of e-business adoption. The last part, section D zeroed-in on the operational efficiency of SMEs. Section A and B questions were structured multiple-choice questions where respondents were requested to pick an appropriate single option from two or more options provided. Likert rating is useful when behaviour and attitudes need to be evaluated on a continuum basis (Leedy and Ormrod, 2013) hence Section C and D had 5 Likert-type scale questions. The entire questions were structured and worded in a way that made it easy for computer analysis.

Van Tonder and Ehlers (2011) state that aligning the questionnaire's contents with the research objectives ensures validity. Yin (2014) also suggests that all elements of research should be soundly developed, closely linked and supported by relevant data sources, from the research problem, research objectives to information gathering and data analysis. Therefore, to ensure validity and reliability, secondary data from most recent publications that were 10 years and younger were used to develop every aspect of the research from the research problem. Additionally, the researcher administered a questionnaire with objective aligned questions. This was developed and used for data gathering.

3.6 Research procedure

After developing the questionnaire, the researcher pretested the questionnaire for content precision, questionnaire validity, and reliability. 15 participants were conveniently selected made up of 10 SME owners and/or managers and 5 academics. Some questions that were believed to be too long and complex to comprehend were rephrased. 132 moderated questionnaires were prepared and 113 were successfully

administered by the researcher to SME owners or/and managers over a period of 8 weeks.

An introductory letter accompanied by research clearance letter from the university were used to establish the researcher's integrity and capacity as a student. Participation in the research was made voluntary and no incentive was offered by the researcher. Voluntary participants signed a consent form to show that they accepted the invitation to participate willingly and they understood the terms and conditions of participation. All the data collection, data analysis methods and research procedures for this research were prepared with constant guidance from the supervisor.

3.7 Data Analysis

The collected quantitative data was captured using Microsoft Excel and exported into SPSS version 22 for descriptive and inferential statistical analysis. Descriptive statistics consist of measures of location and dispersion of variability, where the former is made up of the mean, median, and mode, and the latter is made up of variance, standard deviation, range and quartile deviation (Dubihlela, 2012). Cronbach's Alpha was used to assess the reliability of the research instrument. Cronbach's alpha scores closer to zero indicate lower reliability of the instrument used and the 0.6 score is the acceptable threshold (Malhotra, 2010).

Inferential statistics are used to make predictions from a sample in relation to the broader population through the use of various techniques such as regression analysis, ANOVA, correlation analysis (Wilson, 2010). In this study, descriptive statistics focused on frequencies, measures of central tendency and measures of variation while inferential statistics focused on correlations, one Way ANOVA and multiple regression analysis. The hypothesis was tested using multiple regression analysis. One

Way ANOVA, regression analysis, Pearson's correlation, and t-tests were all computed at 0.05 significance level.

3.8 Research ethics

Ethical behaviour is very important in real life as much as it is important in the field of research, hence honesty and respect for individuals should be observed always (Welman, Kruger and Mitchell, 2011). It is in line with such values that the researcher had ethical considerations for this study. The researcher sought permission and approval from relevant participants prior to research participation. Voluntary participants' rights and privacy were respected throughout the research study. Respondents' identities were protected hence the use of number codes instead of names. Collected data is being kept in a lockable safe, only accessible to the researcher and will be destroyed by burning at the end of 5 years after the research. Just to validate the researcher's ethical behaviour and considerations the researcher requested for an ethical clearance letter from the University and an approval letter to conduct the research was granted by the University prior to study.

3.9 Summary

This chapter provided an account of the research methodology used to attain the research objectives. The researcher used quantitative-survey research approach that followed the descriptive-explanatory design. The population under study comprised of managers and owners of manufacturing SMEs in Windhoek as listed in NMA, a publicly accessible publication. Stratified random sampling was used to select the research participants from the 7 strata. A semi-structured questionnaire with multiple choice and Likert scale questions was used for data collection. The data was captured using Microsoft excel and posted to SPSS version 22 for data analysis. The chapter also

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

In pursuit of understanding the relationship between e-business adoption and SMEs' operational performance, a primary investigation was conducted on manufacturing SMEs in Windhoek. Prior to the study, limited studies regarding ICTs or e-business adoption in the Namibian context could be found. As such the results are crucial towards understanding this phenomenal aspect of the 4th industrial revolution. Data was collected using a semi-structured questionnaire, captured using Microsoft Excel and exported into SPSS for descriptive and inferential statistical analysis. Descriptive statistics consist of measures of location and dispersion of variability, where the former focuses on means while the latter focuses on standard deviation and range. Inferential statistics concentrates on Pearson's correlation and regression analysis where the hypothesis is tested using regression analysis. Where necessary the results are presented in tables and figures for visual illustration.

4.2 Description of sample

4.2.1 Response rate

Data was collected between 1 July 2019 and 24 August 2019, that is over a period of 8 weeks. The survey realised an 85.6% response rate as shown in Table 4.1 below. 85.6% is an acceptable response rate as previous researchers in the same field had varying response rates below 100%, for instance, 62% (Siqueira, *et al*, 2019), 13.8% (Ilin, *et al*, 2017), 62% (Jabeur, *et al*, 2013). Out of 132 questionnaires, 113 were completed. 11 questionnaires could be not be used because the respondents kept on cancelling confirmed meeting dates and understandably so as they were a busy group

of individuals with limited time at their disposal. 8 were discarded as respondents were not comfortable answering certain questions.

Table 4.1: Response rate

Research sample size	Number of researcher administered questionnaires	Response rate
132	113	85.6%

Source: Survey data

4.2.2 Demographic description of the sample

This section focuses on the demographic description of the sample so as to inform the calibre of the research respondents. The segment divulges the respondents' title held within a firm, age, gender, and educational qualifications. It also provides possible reasons for the revealed results.

The research focused on individuals of the highest authority at business firms as one of the criteria for participation in the research, one was supposed to be the owner or an employed manager. Figure 4.1 below shows that 68% of the respondents were business owners and 32% were employed as managers. This is in line with the view that most SMEs are owner-managed, (Nzitunga, 2009; Ogbokor and Ngeendepi, 2012). A higher number of owner-managers compared to employed managers can be attributed to SMEs' financial constraints, hence founders tend to take most of the roles and responsibilities to reduce labour costs.

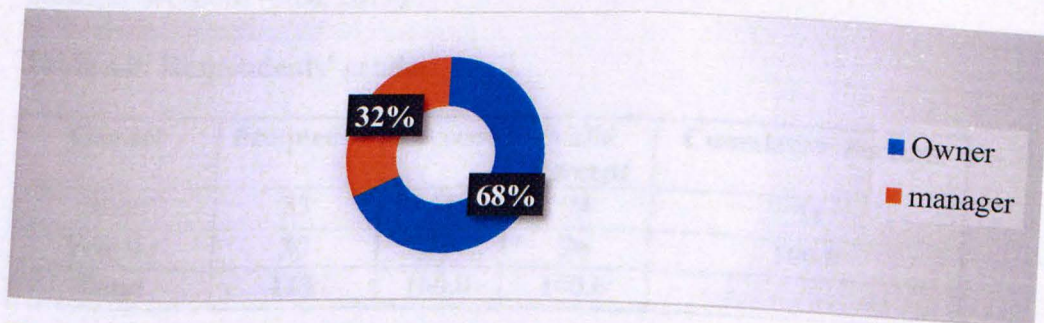


Figure 4.1: Respondent title

Source: Survey data

With respect to the respondents' age distribution, the younger generations dominated with ages ranging from 20 to 29 (21%), 30 to 39 (39%) and 40 to 49 (26%). There were a few business owners and managers in their 50s and beyond making up a total of only 14% of the entire sample as shown in Table 4.2 below. Younger generation dominance could be attributed to the growing unemployment in Namibia hence the need for venturing into entrepreneurship.

Table 4.2: Age structure

Age	Frequency	Percent	Valid Percent	Cumulative Percent
20-29years	24	21.2%	21.2%	21.2%
30-39years	44	38.9%	38.9%	60.2%
40-49years	29	25.7%	25.7%	85.8%
50-59years	10	8.8%	8.8%	94.7%
60+ years	6	5.3%	5.3%	100.0%
Total	113	100.0%	100.0%	

Source: Survey data

Table 4.3 shows below that 74% of respondents were male while 26% were female. The study divulges male dominance among respondents similar to previous researches (Nzitunga, 2009; Ogbokor and Ngeendepi, 2012). This male dominance might be credited to the findings of previous research where females were found to be risk-averse by nature and usually not decision-makers regarding family finances and business decisions (Siba, 2019).

Table 4.3: Respondents' gender

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	83	74	74	74
Female	30	26	26	100.0
Total	113	100.0	100.0	

Source: Survey data

Figure 4.2 below shows the highest educational level of the research sample. The study divulges that the respondents' education level is predominantly the tertiary diploma and certificate holders, making 46% of the respondents. This is followed by 26.5% university degree holders and 25.7% high school certificate holders. Equally, primary school certificate holders together with masters and beyond holders have a frequency of one each equivalent to 0.9% each. The reason for this distribution could be attributed to the technical nature of the manufacturing industry, hence the high prevalence of higher than primary level certificate holders.

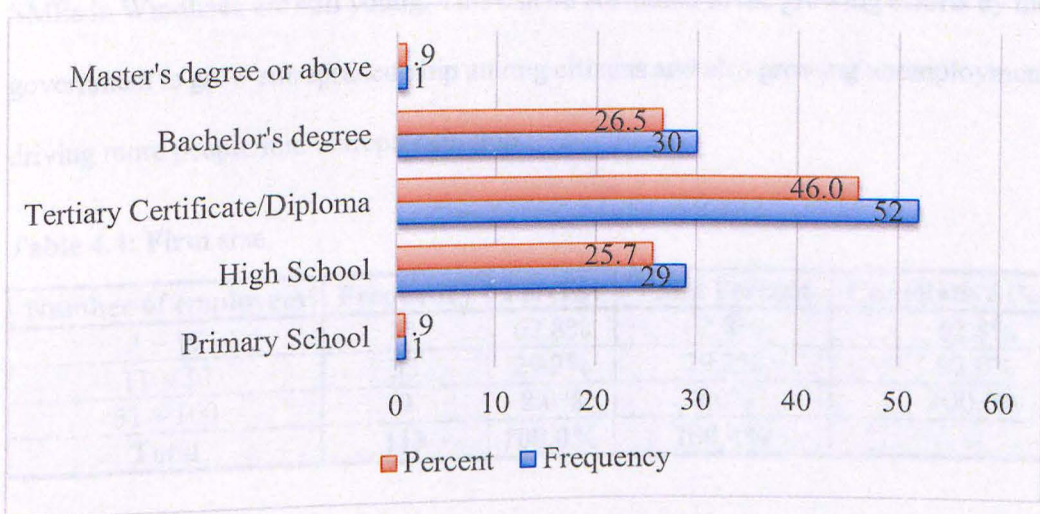


Figure 4.2: Highest educational level

Source: Survey data

4.2.3 Organisational characteristics

SMEs are not uniform they vary based on various features, hence this section divulges organisational characteristics of the SMEs under study. The study reveals firm sizes, business operation period and type of manufacturing sector.

As stated in Chapter 2, SMEs are defined in Namibia based on the number of employees and annual turnover. Mehmet and Emre (2012) stated that companies are hesitant to share their specific statistical information especially financial-related, hence the use of permanent employees' numbers to determine firm size. The research reveals that there are 63% micro-enterprises with 1 to 10 employees, 29% small and 8% medium-sized enterprises with more between 31-100 employees as summarised in Table 4.4 below. This was necessary to assess if there are any differences in e-business adoption based on firm size as stated in Chapter 2. The results reveal that most of the SMEs in Windhoek are still young. This can be attributed to the growing efforts by the government to grow entrepreneurship among citizens and also growing unemployment driving more people into entrepreneurship.

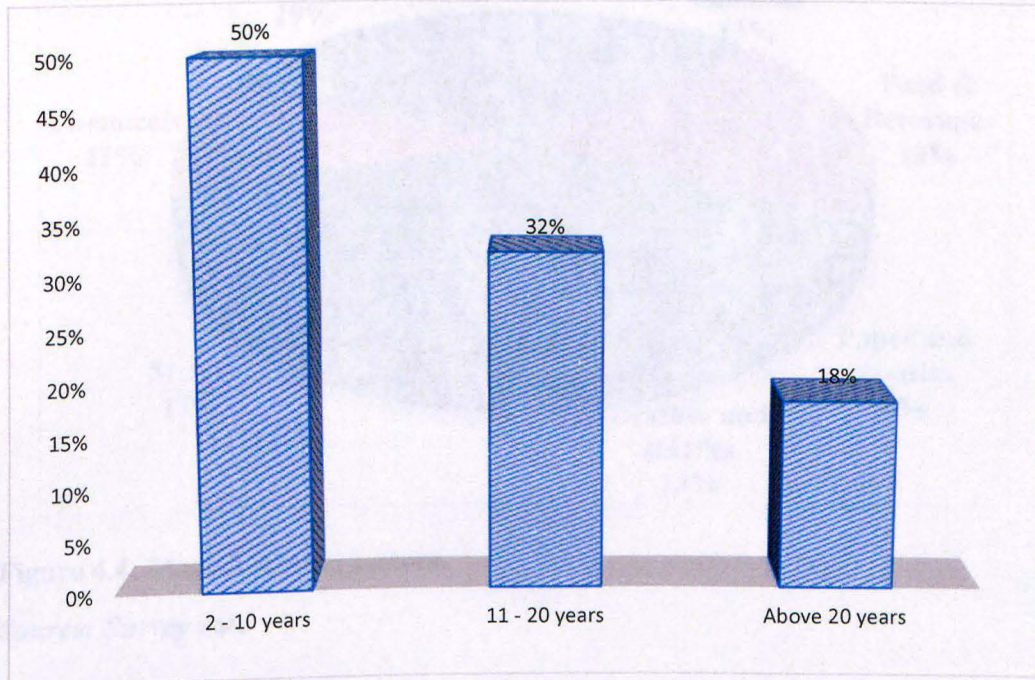
Table 4.4: Firm size

Number of employees	Frequency	Percent	Valid Percent	Cumulative Percent
1 – 10	71	62.8%	62.8%	62.8%
11 – 30	33	29.2%	29.2%	92.0%
31 – 100	9	8.0%	8.0%	100.0%
Total	113	100.0%	100.0%	

Source: Survey data

As already stated in chapter 3, all the SMEs in the study were officially registered with the Ministry of Industrialisation, Trade, and SME Development. All the SMEs under study, are more than two years in operation as listed in publicly available publications from 2016 which was used. The research reveals that 50% of the SMEs are relatively new with up to 10 years since inception, 32% between 11 and 20 years and only 18% above 20 years in operation reference Figure 4.3 below. This could be attributed to the growing efforts by the government in driving entrepreneurship among the youth, coupled with growing unemployment which prompted more people to opt for

entrepreneurship. Most SMEs are emerging as 50% are less than 10 years this is in support of the same assessment that emerged based on the quantity of permanent workforce employed by these manufacturing firms.



Firm's period in business

Figure 4.3: Firm's age in business

Source: Survey data

SMEs were stratified into seven strata with a successful response rate relatively corresponding with the size of each stratum. Food and beverages and wood as the largest portions at 19%, followed by metals at 17%. The research reveals that other manufacturing sector representation is as follows non-metallic minerals and leather and textiles both at 13%, chemicals at 11% and lastly paper and plastics at 8%. The overall percentages illustration is as presented on a pie-chart below in Figure 4.4. These varying percentages could be attributed to the nature of businesses that is the

complexity and capital injection requirements with food and beverages, wood and metal sectors are relatively cheaper than the latter sectors.

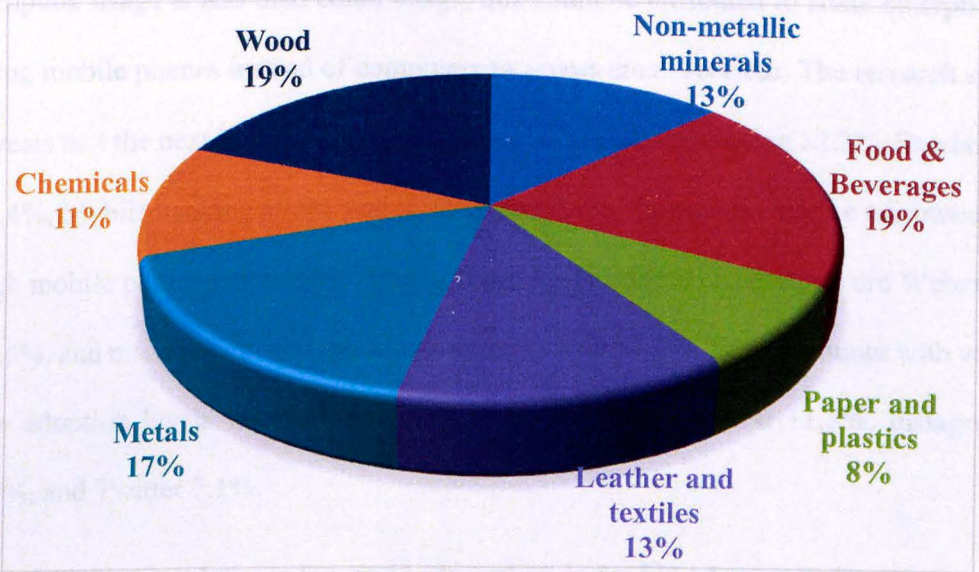


Figure 4.4: Manufacturing sectors.

Source: Survey data

4.3 E-business technologies used

This segment focuses on how the sample adopted various e-business technologies followed by the impact of firms' characteristics and respondents' features. The e-business technologies under study are e-mails, internal computer systems, online banking, mobile banking, websites, management and operations systems, online information storage systems and social media network platforms such as Instagram, Twitter, Facebook, and WhatsApp. Additionally, the section reveals how different respondents and organisational characters affected the adoption of these e-business technologies.

Respondents responded yes or no to adopting each of the e-business technologies under study. Frequencies and case percentages of those who admitted to have adopted each of the e-business technologies are presented in Figure 4.5. The majority of

respondents admitted that they adopted emails and internal computer system. 92.9% adopted emails, while 85.8% adopted internal computer system. This shows that computer usage is less than email usage, this could be attributed to some enterprises using mobile phones instead of computers to access email services. The research also reveals that the next highly adopted technologies are online banking 82.3%, Facebook 81.4%, Mobile banking 69.9% and WhatsApp 52.2%, these could also be attributed to high mobile phone penetration. Among fairly lowly adopted techniques are Websites 42.5%, and management and operations systems with 37.2%. The techniques with very low adoption levels were online information storage systems at 11.5%, Instagram 9.7%, and Twitter 7.1%.

Website usage is relatively low at 42.5%, unlike in the EU where website adoption is between 74% to 77% (Eurostat, 2018) and Gweru with 80% adoption (Gumbo, *et al*, 2014). High e-mail adoption is similar to findings that emerged in previous studies conducted in Malaysia (Mohamad and Ismail, 2011) and Yemeni SMEs as well (Abdullah, *et al* 2018). Banking and financial e-business techniques are well adopted with online banking at 82.3% and mobile banking at 69.9% unlike in Palestine where banking and financial e-business techniques were only adopted by 0.2% in a countrywide survey (Abualrob and Kang, 2016). Facebook's highest adoption ahead of other social media networks with 81.4% is a similar result to a study that was done on SMEs in Gweru (Gumbo *et al.*, 2014).

Overall, the research reveals a high adoption of low-end e-business techniques such as general use of computers, emails, and Facebook. Additionally, there is also a low adoption of high-end e-business techniques such as management and operations systems, online information storage and recently launched social media network platforms compared to Facebook. High adoption of low-end e-business techniques

may perhaps be attributed to lower costs associated with setting up and usage costs compared to high-end e-business technologies.

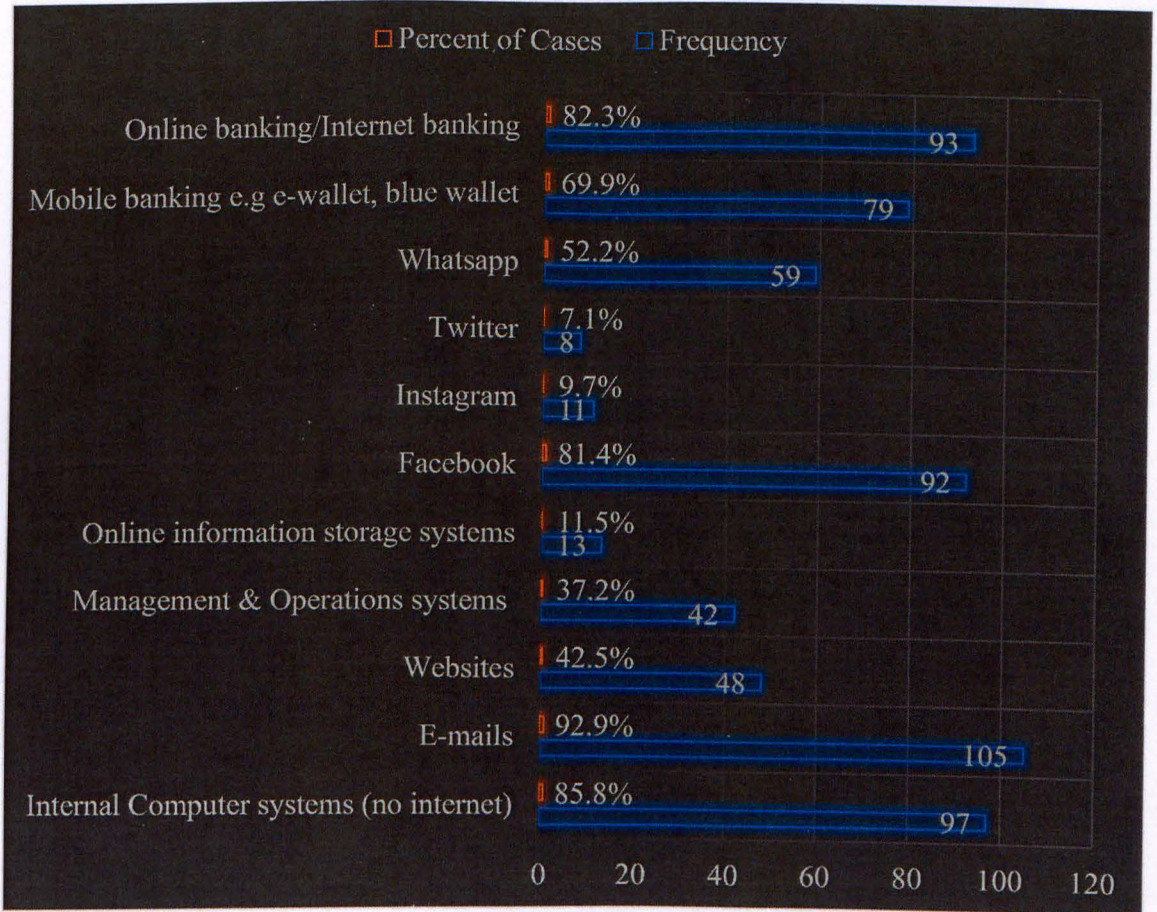


Figure 4.5: E-business technologies

Source: Survey data

As already revealed earlier, males were the majority in the gender respondents' category. Figure 4.6 below reveals that male-dominated each of those who admitted to have adopted each of the e-business technologies. This male domination can be attributed to the fact that e-business technologies used within a firm are not dependent on the owner or management's gender as the dominance followed the general bias in

the gender distribution of the sample. The business owners were also the majority ahead of employed managers.

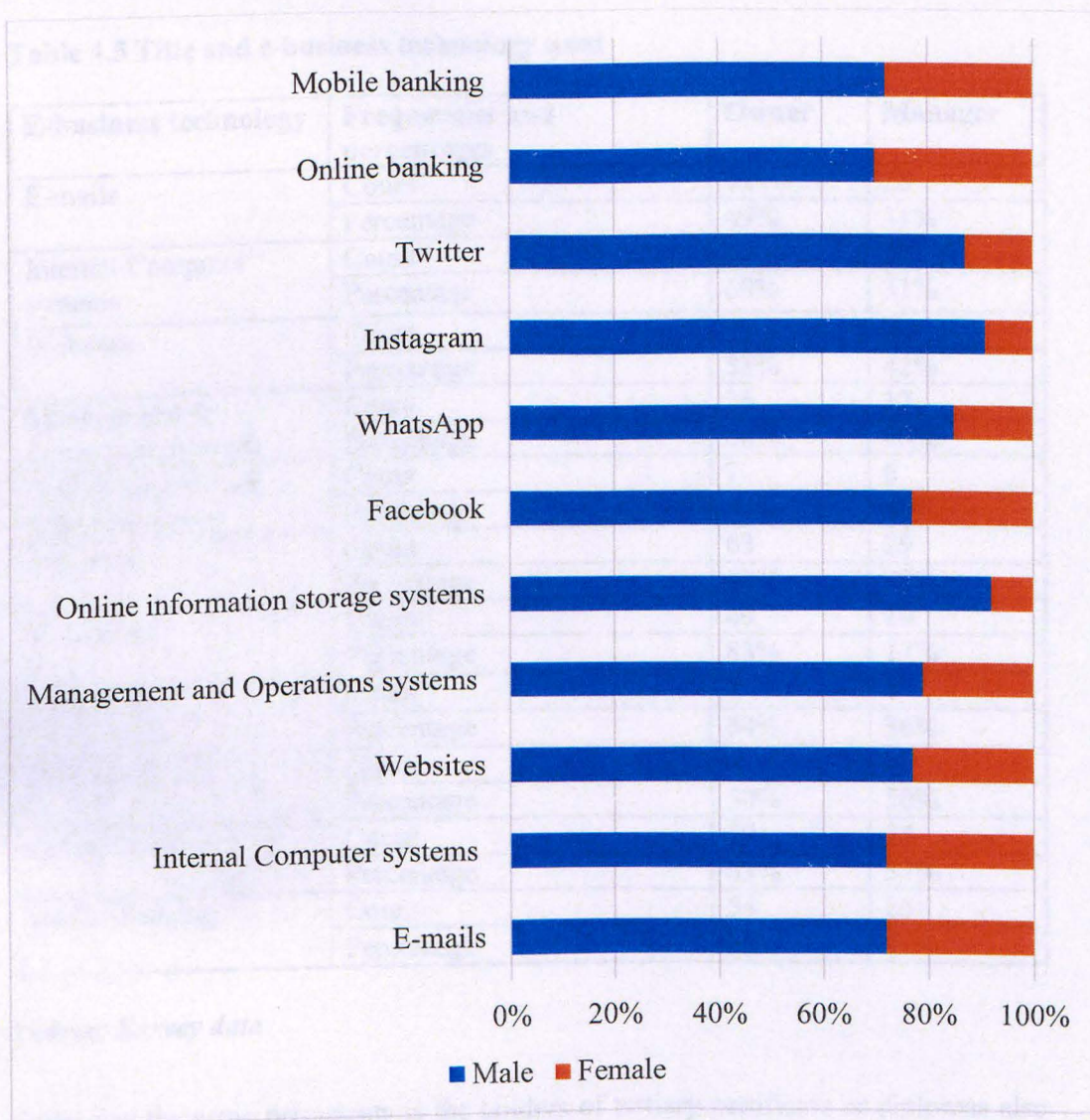


Figure 4.6: Gender and e-business adoption

Source: Survey data

Table 4.5 below reveals that business owners also dominated each of the adopted e-business technologies except for Twitter which has a 50% distribution. This can be

attributed to the very small number of adopters in general as this is one of the lowly adopted e-business technologies.

Table 4.5 Title and e-business technology used

E-business technology	Frequencies and percentages	Owner	Manager
E-mails	Count	72	33
	Percentage	69%	31%
Internal Computer systems	Count	67	30
	Percentage	69%	31%
Websites	Count	28	20
	Percentage	58%	42%
Management & Operations systems	Count	25	17
	Percentage	60%	40%
Online information storage systems	Count	7	6
	Percentage	54%	46%
Facebook	Count	63	29
	Percentage	68%	32%
WhatsApp	Count	49	10
	Percentage	83%	17%
Instagram	Count	7	4
	Percentage	64%	36%
Twitter	Count	4	4
	Percentage	50%	50%
Online banking	Count	59	34
	Percentage	63%	37%
Mobile banking	Count	54	25
	Percentage	68%	32%

Source: Survey data

Following the same precedents is the holders of tertiary certificate or diplomas also dominating majority of the adopted e-business technology categories, except for where Bachelor’s degree holders dominated reference Table 4.6. High school and Bachelor’s degree holders are almost equally distributed among respondents. However, the latter dominated more between the two groups for instance on online information storage (62%), Instagram (45%) and Twitter (50%). Dominance of tertiary education holders and bachelor’s degree holders among adopters is in support of previous researchers’

findings that education impacts influence to adopt or not to adopt e-business technologies (Chatzoglou and Chatzoudes, 2016; Ilin, *et al*, 2017).

Table 4.6: Education and adoption

E-business technologies	Frequency and percentage	Primary School	High School	Tertiary Certificate Diploma	Bachelor's degree	Master's degree or above
E-mails	Frequency	1	26	48	29	1
	Percentage	1%	25%	46%	28%	1%
Internal Computer systems	Frequency	1	25	43	27	1
	Percentage	1%	26%	44%	28%	1%
Websites	Frequency	1	5	26	15	1
	Percentage	2%	10%	54%	31%	2%
Management & Operations systems	Frequency	1	8	18	14	1
	Percentage	2%	19%	43%	33%	2%
Online information storage systems	Frequency	1	1	2	8	1
	Percentage	8%	8%	15%	62%	8%
Facebook	Frequency	1	24	47	20	0
	Percentage	1%	26%	51%	22%	0%
WhatsApp	Frequency	1	20	26	12	0
	Percentage	2%	34%	44%	20%	0%
Instagram	Frequency	1	2	3	5	0
	Percentage	9%	18%	27%	45%	0%
Twitter	Frequency	1	0	3	4	0
	Percentage	13%	0%	38%	50%	0%
Online banking	Frequency	1	24	39	28	1
	Percentage	1%	26%	42%	30%	1%
Mobile banking	Frequency	1	25	35	18	0
	Percentage	1%	32%	44%	23%	0%

Source: Survey data

The general dominating age group for the study is 30 to 39 years among respondents.

This age category also dominated each of the adopted e-business technology

references in Table 4.7 below. The study reveals that the age of the SME owner or manager does not affect e-business adoption.

Table 4.7: Age and e-business technology adoption

E-business technology	Frequency and percentage	20-29years	30-39years	40-49years	50-59years	60+ years
E-mails	Frequency	21	42	28	8	6
	Percentage	19%	40%	27%	8%	6%
Internal Computer systems	Frequency	20	37	25	9	6
	Percentage	21%	38%	26%	9%	6%
Websites	Frequency	11	25	8	4	0
	Percentage	23%	52%	17%	8%	0%
Management and Operations systems	Frequency	10	16	9	2	5
	Percentage	23%	38%	22%	5%	12%
Online information storage systems	Frequency	3	6	4	0	0
	Percentage	23%	46%	31%	0%	0%
Facebook	Frequency	21	32	23	10	6
	Percentage	22%	35%	25%	11%	7%
WhatsApp	Frequency	11	21	14	8	5
	Percentage	19%	36%	24%	14%	8%
Instagram	Frequency	2	4	3	2	0
	Percentage	18%	36%	27%	18%	0%
Twitter	Frequency	2	3	1	2	0
	Percentage	25%	38%	12%	25%	0%
Online banking	Frequency	21	39	20	7	6
	Percentage	22%	42%	22%	8%	6%
Mobile banking	Frequency	17	29	20	8	5
	Percentage	22%	37%	25%	10%	6%

Source: Survey data

SME owners and managers from micro-businesses with 1 to 10 employees dominated the sample followed by respondents from small and medium firms respectively. Table 4.8 below shows that respondents from micro-sized firms had majority admitting to be using each of the adopted technologies. This distribution could be attributed to the general domination of respondents from micro-business size.

Table 4.8: Firm size and e-business technology

E-business technology	Frequency and Percentage	Number of permanent employees		
		1 – 10	11 – 30	31 – 100
E-mails	Count	49	35	21
	Percentage	47%	33%	20%
Internal Computer systems	Count	43	35	19
	Percentage	44%	36%	20%
Websites	Count	24	12	12
	Percentage	50%	25%	25%
Management and Operations systems	Count	19	12	11
	Percentage	45%	29%	26%
Online information storage systems	Count	7	3	3
	Percentage	54%	23%	23%
Facebook	Count	62	25	5
	Percentage	67%	27%	5%
WhatsApp	Count	45	13	1
	Percentage	76%	22%	2%
Instagram	Count	8	2	1
	Percentage	73%	18%	9%
Twitter	Count	5	1	2
	Percentage	63%	13%	25%
Online banking	Count	52	32	9
	Percentage	56%	34%	10%
Mobile banking	Count	58	16	5
	Percentage	73%	20%	6%

Source: Survey data

Emerging businesses that are less than 10 years old were also the majority of overall participants and dominated the adoption of each e-business technology. Table 4.9 below reveals that emerging SMEs dominated almost every adopted e-business technology with varying percentages except for Twitter which is equally adopted by micro and small businesses at 50% each.

Table 4.10: E-business technology and manufacturing sector

Table 4.9: Age of business and e-business technology

E-business technology	Frequency and Percentage	Age of business (years)		
		2 – 10	11 – 20	Above 20
E-mails	Count	49	35	21
	Percentage	47%	33%	20%
Internal Computer systems	Count	43	35	19
	Percentage	44%	36%	20%
Websites	Count	24	12	12
	Percentage	50%	25%	25%
Management and operations systems	Count	19	12	11
	Percentage	45%	29%	26%
Online information storage systems	Count	7	3	3
	Percentage	54%	23%	23%
Facebook	Count	49	30	13
	Percentage	53%	33%	14%
WhatsApp	Count	35	18	6
	Percentage	59%	31%	10%
Instagram	Count	6	5	0
	Percentage	55%	45%	0%
Twitter	Count	4	4	0
	Percentage	50%	50%	0%
Online banking	Count	48	25	20
	Percentage	52%	27%	22%
Mobile banking	Count	42	26	11
	Percentage	53%	33%	14%

Source: Survey data

Table 4.10 below shows how each stratum adopted each of the e-business technologies. All the strata almost proportionately adopted each e-business technology except for wood category which dominated WhatsApp adoption with a frequency of 16 out of 59 adopters while other strata had frequencies ranging between 4 and 9.

Table 4.10: E-business technology and manufacturing sector

Item	Non-metallic minerals	Food & Beverages	Paper and plastics	Leather and textiles	Metals	Chemicals	Wood	Total
Strata	15	22	9	15	19	12	21	113
B1	15	19	9	14	19	12	17	105
B2	14	20	7	13	17	10	16	97
B3	7	10	5	8	8	4	6	48
B4	7	9	4	4	8	5	5	42
B5	3	5	1	1	2	0	1	13
B6	12	16	8	14	16	10	16	92
B7	8	8	4	8	9	6	16	59
B8	1	3	0	2	2	1	2	11
B9	3	2	0	0	1	0	2	8
B10	13	21	8	14	14	8	15	93
B11	11	12	6	10	12	10	18	79

Source: Survey data

4.4 E-business adoption

After effectively revealing the e-business technologies used by SMEs in the previous section this part discusses e-business adoption focusing on e-business adoption usage levels, e-business drivers and lastly impact of e-business adoption on business performance. Various descriptive and inferential statistics are used where appropriate.

The adopted e-business technologies are not adopted at the same usage level from one firm to another. The research reveals that some firms unlock greater value from the adopted e-business tools by using them on a daily basis while others occasionally use them such as weekly and monthly usage. Table 4.11 below and 100% stacked bar Figure 4.7 below gives a visual representation of the e-business adoption level among manufacturing SMEs in Windhoek. A 100% stacked bar was used as it clearly visualises the comparison in percentages each category contributes to the total.

Table 4.11: E-business use

E-business technologies	Total adoptions	Daily use		Weekly use		Monthly use	
		Frequency	%	Frequency	%	Frequency	%
Internal Computer systems	97	97	100%	0	0%	0	0%
E-mails	105	97	92%	8	8%	0	0%
Websites	48	29	60%	8	17%	11	23%
Management & Operations systems	42	32	76%	7	17%	3	7%
Online information storage systems	13	9	69%	4	31%	0	0%
Facebook	92	41	45%	22	24%	29	32%
Instagram	11	5	46%	3	27%	3	27%
Twitter	8	5	62%	0	0%	3	38%
WhatsApp	59	58	98%	1	2%	0	0%
Mobile banking	79	65	82%	13	16%	1	2%
Online banking	93	67	72%	17	18%	9	10%

Source: Survey data

The visual representation below shows that of all the SMEs that make use of computers at their firms, they use them on a daily basis. Emails and WhatsApp also have very high daily usage of above 90%, while few firms occasionally use these two e-business tools. Twitter, Instagram, websites, and Facebook have high occasional usage. However, overall the SMEs are making use of the technologies more frequently on a daily basis than occasional use.

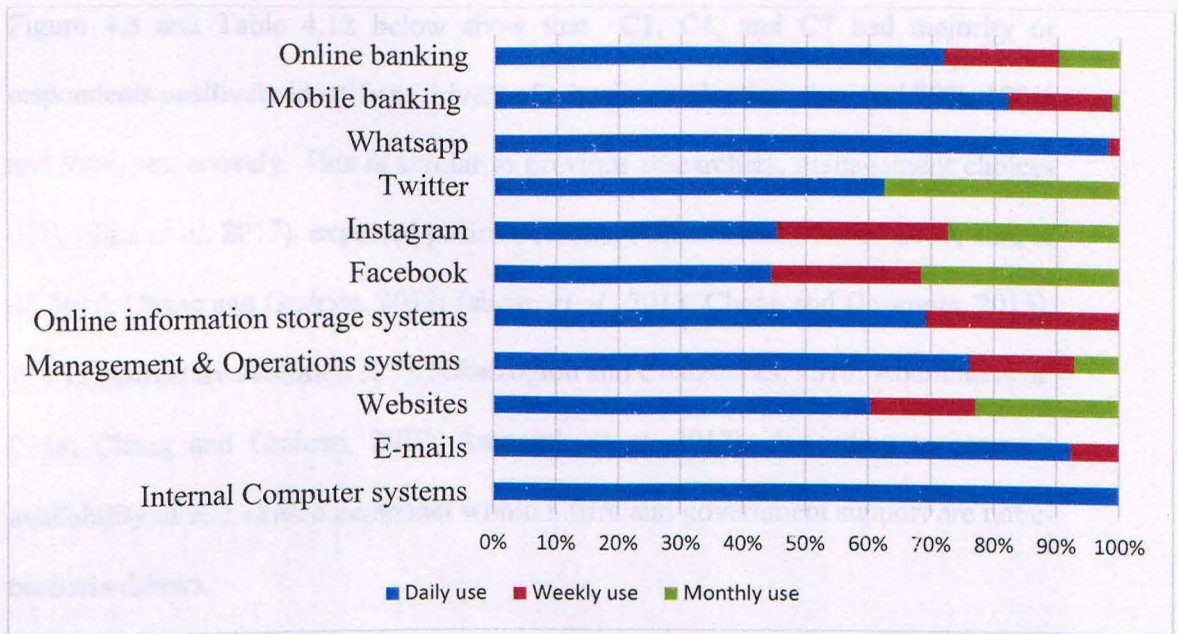


Figure 4.7: E-business adoption usage

Source: Survey data

Table 4.12 sum-up the respondents' opinions regarding e-business drivers understudy and Figure 4.8 below shows the number of respondents who agreed or/and strongly agreed with each of the e-business drivers. A very negligible number of respondents were undecided regarding each of the listed drivers ranging between 0% and 3%, the majority had clear definite opinions reference Table 4.12. The availability of ICT skilled personnel (C2) and government support (C6) are on the one extreme where 88% and 97% of respondents' state that they are not drivers of e-business adoption. This is in conflict with earlier investigations where availability of ICT skilled personnel was a major driver (Ilin,*et al*; Sharma, 2014; Chang and Dasgupta, 2015) and government support was also a dominating driver (Ilin, *et al*, 2017; Chang and Graham,2012). C3 and C5 i.e. growing firm size and stakeholder pressure are weak drivers of e-business adoption as they have almost equal respondents as either in agreement or in disagreement.

Figure 4.8 and Table 4.12 below show that C1, C4, and C7 had majority of respondents positively identify as drivers of e-business adoption, they had 79%, 100% and 98%, respectively. This is similar to previous researchers, management choices (C1), (Ilin, *et al*, 2017), expected positive results, (Olivera and Martin, 2010; Ilin, *et al*, 2017; Chang and Graham, 2012; Jabeur, *et al*, 2013; Chang and Dasgupta, 2015), ICT infrastructure evolution (C7), (Chatzoglou and Chatzoudes, 2016; Abdullah *et al*, 2018; Chang and Graham, 2012; Antoniuk *et al*, 2017). According to research availability of ICT skilled personnel within a firm and government support are not e-business drivers.

Table 4.12: E-business adoption drivers

C	Strongly disagree		Disagree		Undecided		Agree		Strongly agree	
	Freque ncy	%	Freque ncy	%	Freque ncy	%	Freque ncy	%	Freque ncy	%
C1	8	9%	15	12%	1	1%	30	26%	59	52%
C2	60	53%	28	25%	1	1%	17	15%	7	6%
C3	27	24%	24	21%	2	2%	35	31%	25	22%
C4	0		0		0	0	2	2%	111	98%
C5	16	14%	25	22%	0	0	32	28%	40	35%
C6	110	97%	1	1%	0	0	1	1%	1	1%
C7	0		0		3	3%	29	26%	81	72%
Where C1- management choices, C2- ICT skilled personal, C3-growing firm size										
C4-expected positive results, C5 -Stakeholder pressure, C6-Government support, C7- ICT infrastructure evolution										

Source: Survey data

Table 4.13: E-business drivers: means and variability

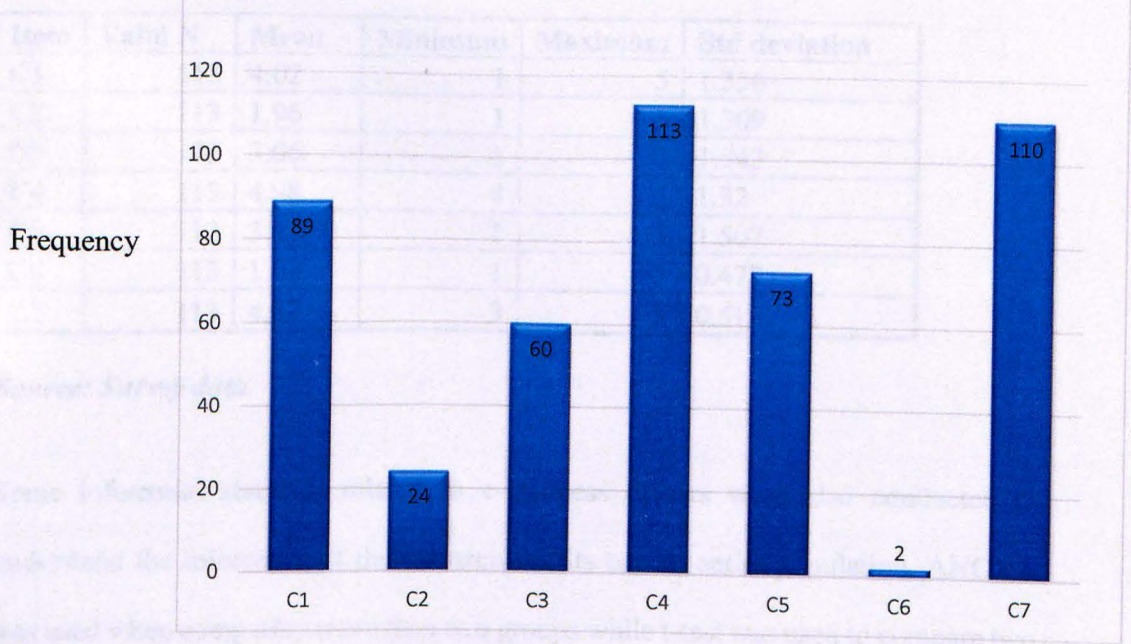


Figure 4.8: E-business drivers

Source: Survey data

Table 4.13 below shows the amount of variability related to the mean and the mean values of section C items which are e-business drivers. On a 1 to 5-point scale ratings, three drivers are positively skewed C1, C4, and C7 with very high means above 4. The most important driver is C4 (M=4.98, SD=1.32), followed by C7 (M=4.69, SD=0.52) and C1 (M=4.02, SD=1.34). This means that most participants rated these e-business adoption drivers fairly high on the relevance scale with only a small number rating them noticeably lower. The drivers with the least means are C2 (M=1.96, SD=1.31) and C6 (M=1.07, SD=0.48). This shows that most participants disagreed that they are important drivers of e-business. Drost (2011) states that the ideal standard deviation is less than one. However, less than 2 is recommended and it indicates the absence of outliers.

Table 4.13: E-business drivers' means and variability

Item	Valid N	Mean	Minimum	Maximum	Std deviation
C1	113	4.02	1	5	1.336
C2	113	1.96	1	5	1.309
C3	113	3.06	1	5	1.543
C4	113	4.98	4	5	1.32
C5	113	3.49	1	5	1.507
C6	113	1.07	1	5	0.477
C7	113	4.69	3	5	0.519

Source: Survey data

Some inferential statistics related to e-business drivers were also conducted to understand the inferences of the research results on the entire population. ANOVA was used when comparing more than two groups while t-test was used to compare two groups.

Table 4.14 below shows ANOVA results for e-business drivers based on four groups of respondents' ages. All the e-business adoption drivers have 5 and 107 degrees of freedom. The following e-business drivers were statistically significant as e-business adoption drivers with their p values at $p < 0.05$, these are management choices ($p = 0.005$, F-ratio = 3.556), expected positive results ($p < 0.01$, F-ratio = 21.62) and ICT infrastructure evolution ($p = 0.006$, F-ratio = 3.43). The following e-business drivers were not statistically significant in explaining e-business adoption as their p values ($p > 0.05$), these are ICT skilled personnel ($p = 0.771$, F-ratio = 0.507), growing firm size ($p = 0.638$, F-ratio = 0.682), stakeholder pressure ($p = 0.059$, F-ratio = 2.202) and government support ($p = 0.85$, F-ratio = 0.396). These large p values suggest that one of the respondents' age groups differs from others.

The results further present that only one e-business driver, that is the expected positive results have almost equal within and between group variations, where $SS(B) = 0.987$

and $SS(W)=0.977$. This implies that all members within and between groups generally had similar opinions regarding this e-business driver. The overall results show that all the variations between groups are less than the within group variations for each of the e-business drivers with varying differences based on the sum of squares figures. This means that members from different groups generally have similar opinions regarding these e-business drivers.

Table 4.14: Respondents' age ANOVA results

E-business drivers		Sum of Squares	Df	Mean Square	F	Sig.
Management choices	Between Groups	28.495	5	5.699	3.556	.005
	Within Groups	171.469	107	1.603		
	Total	199.965	112			
ICT skilled personnel	Between Groups	4.437	5	.887	.507	.771
	Within Groups	187.421	107	1.752		
	Total	191.858	112			
Growing firm size	Between Groups	8.238	5	1.648	.682	.638
	Within Groups	258.328	107	2.414		
	Total	266.566	112			
Expected positive results	Between Groups	.987	5	.197	21.620	.000
	Within Groups	.977	107	.009		
	Total	1.965	112			
Stakeholder pressure	Between Groups	23.722	5	4.744	2.202	.059
	Within Groups	230.509	107	2.154		
	Total	254.230	112			
Government support	Between Groups	.462	5	.092	.396	.850
	Within Groups	24.971	107	.233		
	Total	25.434	112			
ICT infrastructure evolution	Between Groups	4.166	5	.833	3.430	.006
	Within Groups	25.993	107	.243		
	Total	30.159	112			
Significance level (p=0.05)						

Source: Survey data

Table 4.15 below demonstrates ANOVA results for e-business drivers based on five groups of respondents' education levels. Two of the e-business drivers are statistically significant as their p values are $p < 0.05$ these are management choices $F(4,108) = 8.084, P < 0.01$ and ICT skilled personnel $F(4,108) = 2.78, p = 0.03$.

The most ideal F ratio value is the one around value 1 (Zar, 2010). Therefore, expected positive results have the ideal F-ratio where $F(4,108) = 0.254, P < 0.907$, also growing firm size $F(4,108) = 1.473, p = 0.215$, government support $F(4,108) = 1.428, p = 0.23$ and ICT infrastructure evolution $F(4,108) = 1.734, p = 0.148$. This infers that the population is likely to view these e-business drivers similar to the sample's results.

The other results are as follows, management choices $F(4,108) = 8.084, p < 0.01$, ICT skilled personnel $F(4,108) = 2.78, p = 0.03$ and stakeholder pressure $F(4,108) = 2.068, p = 0.09$. These results lead to the conclusion that the population very unlikely to view these e-business drivers in the same way as the sample.

The results also show that all the variations between groups (SS(B)) are less than the within group variations (SS(W)) for each of the e-business drivers with varying differences based on the sum of squares figures. This means that members from different groups generally have similar opinions regarding these e-business drivers.

Table 4.15: Respondents' educational level - ANOVA results

		Sum of Squares	Df	Mean Square	F	Sig.
Management Choices	Between Groups	46.075	4	11.519	8.084	.000
	Within Groups	153.890	108	1.425		
	Total	199.965	112			
ICT skilled personnel	Between Groups	17.912	4	4.478	2.780	.030
	Within Groups	173.947	108	1.611		
	Total	191.858	112			
	Between Groups	13.794	4	3.449	1.473	.215

Growing firm size	Within Groups	252.772	108	2.340		
	Total	266.566	112			
Expected positive results	Between Groups	.018	4	.005	.254	.907
	Within Groups	1.946	108	.018		
	Total	1.965	112			
Stakeholder pressure	Between Groups	18.090	4	4.523	2.068	.090
	Within Groups	236.140	108	2.186		
	Total	254.230	112			
Government support	Between Groups	1.277	4	.319	1.428	.230
	Within Groups	24.156	108	.224		
	Total	25.434	112			
ICT infrastructure evolution	Between Groups	1.820	4	.455	1.734	.148
	Within Groups	28.339	108	.262		
	Total	30.159	112			
Level of significance (p=0.05)						

Source: Survey data

Table 4.16 below shows independent t-test results for the two respondents title groups that are the business owner or business manager. There was a significant difference in the scores for business owners and business managers for some e-business drivers. ICT skilled personnel, $t(54.64) = 3.115$, $p = 0.003$, stakeholder pressure $t(60.22) = 2.136$, $p = 0.037$, and ICT infrastructure evolution $t(97.72) = 2.335$, $p = 0.022$. These are also good p values as they imply that there is a very negligible chance that the obtained research results happened by chance, hence can be repeated elsewhere in a larger population. The other remaining e-business drivers had p values $p > 0.05$ such as government support $t(35) = 0.8711$, $p = 0.118$, growing firm size $t(111) = 1.685$, $p = 0.095$ and expected positive results $t(111) = 0.273$, $p = 0.582$. This implies that business title has an effect on some e-business drivers.

Table 4.16: respondents title independent sample test results

		Levine's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Management Choices	EVA	1.281	.260	-.658	111	.512	-.178	.270
	EVNA			-.689	77.133	.493	-.178	.258
ICT skilled personnel	EVA	17.418	.000	-3.437	111	.001	-.867	.252
	EVNA			-3.115	54.638	.003	-.867	.278
Growing firm size	EVA	.405	.526	-1.685	111	.095	-.521	.309
	EVNA			-1.692	69.160	.095	-.521	.308
Expected positive results	EVA	1.216	.273	.551	111	.582	.015	.027
	EVNA			.482	50.854	.632	.015	.031
Stakeholder pressure	EVA	6.429	.013	2.254	111	.026	.674	.299
	EVNA			2.136	60.216	.037	.674	.315
Government support	EVA	24.769	.000	-2.356	111	.020	-.222	.094
	EVNA			-1.603	35.000	.118	-.222	.139
ICT infrastructure evolution	EVA	18.662	.000	-2.032	111	.045	-.210	.103
	EVNA			-2.335	97.122	.022	-.210	.090

Note: 95% confidence interval, EVA- Equal variances assumed, EVNA-Equal variances not assumed

Source: Survey data

An independent t-test was conducted on e-business drivers to compare male and female scores. There were no significant differences in the scores for males and females on all e-business drivers because all the p values (sig 2 tailed) are $p > 0.05$ reference Table 4.17 below. Management choices $t(111) = 0.871, p = 0.386$, ICT skilled personnel, $t(111) = 0.01, p = 0.992$, growing firm size $t(111) = 0.847, p = 0.399$, expected positive results $t(111) = 0.753, p = 0.453$, stakeholder pressure $t(111) = 0.272, p = 0.225$,

and government support $t(111) = 0.390, p = 0.697$. these results suggest that gender differences in the person of the highest authorities at SMEs do not affect e-business adoption drivers.

Table 4.17: Gender independent sample test results.

		Levine's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Management Choices	EVA	1.039	.310	-.871	111	.386	-.248	.285
	EVNA			-.938	59.612	.352	-.248	.265
ICT skilled personnel	EVA	.314	.576	-.010	111	.992	-.003	.280
	EVNA			-.010	48.659	.992	-.003	.289
Growing firm size	EVA	.897	.346	-.847	111	.399	-.279	.329
	EVNA			-.860	52.932	.393	-.279	.324
Expected positive results	EVA	2.266	.135	.753	111	.453	.021	.028
	EVNA			.601	36.850	.552	.021	.035
Stakeholder pressure	EVA	1.220	.272	1.219	111	.225	.390	.320
	EVNA			1.189	49.087	.240	.390	.328
Government support	EVA	.607	.438	-.390	111	.697	-.040	.102
	EVNA			-.356	44.039	.723	-.040	.112
ICT infrastructure evolution	EVA	.009	.925	-.119	111	.905	-.013	.111
	EVNA			-.117	49.812	.907	-.013	.113

95% confidence interval, EVA-Equal variance assumed, EVNA- Equal variance not assumed

Source: Survey data.

This section discusses results based on section D of the questionnaire. The results reveal the respondents' thoughts regarding the e-business adoption and SMEs' operational performance. Various business operational performance measures obtained from reviewed literature were used.

Table 4.18 below illustrates that respondents unanimously admitted that e-business adoption leads to improvement in customer retention with zero frequencies for strongly disagree, disagree and undecided. This shows that improvement in customer retention is a major effect of e-business adoption, this has been identified by previous studies (Chung, 2013; Tarutė & Gatautis, 2014).

Table 4.18: Improved customer retention

			Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	Strongly disagree	0	0.0	0.0	0.0
	2	Disagree	0	0.0	0.0	0.0
	3	Undecided	0	0.0	0.0	0.0
	4	Agree	5	4.4	4.4	4.4
	5	Strongly agree	108	95.6	95.6	100.0
		Total	113	100.0	100.0	

Source: Survey data

Unlike improved customer retention low employee turnover seem not to be affected by e-business adoption. Table 4.19 below displays that a greater number of respondents precisely 76% did not acknowledge low employee turnover to be positively impacted by e-business adoption. 16 respondents that are 14% of the respondents were undecided while 11 respondents constituting 10% admitted that e-business adoption leads to low employee turnover. Therefore, low employee turnover is not positively affected by a firm's e-business adoption. This is unlike a previously

conducted study where it was concluded that e-business positively reduces employee turnover (Tarutė and Gatautis, 2014).

Table 4.19: Low employee turnover

			Frequency	Percent %	Valid Percent %	Cumulative Percent %
Valid	1	Strongly disagree	68	60 %	60 %	60 %
	2	Disagree	18	16 %	16 %	76 %
	3	Undecided	16	14 %	14 %	90 %
	4	Agree	4	4 %	4 %	94 %
	5	Strongly agree	7	6 %	6 %	100.0 %
		Total	113	100.0 %	100.0 %	

Source: Survey data

There are almost equal percentages under each of the following groups, those who admitted, undecided and against productivity growth as a result of e-business adoption. Table 4.20 below displays grant total frequencies and percentages for each of these groups. The table shows that only one-third of the respondents admitted that e-business adoption positively affects productivity while another third was undecided and the last third in disagreement with the statement. This made productivity growth not a major outcome of e-business adoption among manufacturing SMEs in Windhoek.

Table 4.20: Productivity growth

	Frequency	Valid percent
Didn't acknowledge	36	32%
Undecided	36	32%
Acknowledged	41	36%
Total	113	100%

Source: Survey data

The research also assessed revenue growth as a result of e-business adoption. Table 4.21 below reveals that the majority of respondents 65% of the respondents admitted that e-business adoption increased their respective firms' revenue. 17% were undecided while 18% admitted that there is no revenue growth as a result of e-business adoption. These results confirm that revenue growth is a significant result of e-business adoption for manufacturing SMEs in Windhoek. This is aligned with the view shared by other previous researches (Chung, 2013; Belekoukias, *et al*, 2014).

Table 4.21: Revenue growth

			Frequency	Percent %	Valid Percent %	Cumulative Percent %
Valid	1	Strongly disagree	4	4.0	4	4
	2	Disagree	16	14.0	14	18
	3	Undecided	19	17.0	17	35
	4	Agree	48	42.0	42	77.0
	5	Strongly agree	26	23.0	23.0	100.0
		Total	113	100.0	100.0	

Source: Survey data

Reduced operational costs had 47% of respondents in agreement and 50% in strong agreement making it another firmly approved e-business adoption positive outcome. Table 4.22 below shows that 97% of the respondents acknowledged that e-business adoption leads to reduced operational costs while only 3% was undecided. Table 4.23 below shows a resounding agreement that e-business adoption leads to improvement in speed and flexibility in conducting business. These results confirm previously conducted studies that e-business leads to reduced operational costs and improved speed and flexibility in conducting business (Chung, 2013; Bayo-Moriones, *et al*, 2013; Belekoukias, *et al*, 2014).

Table 4.22: Reduced operational costs.

			Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	Strongly disagree	0	0.0	0.0	0.0
	2	Disagree	0	0.0	0.0	0.0
	3	Undecided	3	2.7%	2.7%	2.7%
	4	Agree	53	46.9%	46.9%	49.6%
	5	Strongly agree	57	50.4%	50.4%	100.0%
		Total	113	100.0%	100.0%	

Source: Survey data

Table 4.23: Improved speed and flexibility

			Frequency	Percent	Valid Percent	Cumulative Percent
Valid		Strongly disagree	0	0.0	0.0	0.0
		Disagree	0	0.0	0.0	0.0
		Undecided	0	0.0	0.0	0.0
		Agree	2	1.8	1.8	1.8
		Strongly agree	111	98.2	98.2	100.0
		Total	113	100.0	100.0	

Source: Survey data

Table 4.24 below shows measures of central tendency and measures of dispersion for section D of the questionnaire. The least mean for the business operational performance section is 1.8 (Item D2) and the maximum mean of 4.98 (Item D6) resulting in a range of 3.18. The wide range could be attributed to varying minimum values that are 1, 3 and 4, although the maximum is uniform from Item D1 to Item D6. The minimum mean which is closer to minimum 1 is 1.8 (Item D2) indicate that the majority of respondents disapproved of low employee turnover as a positive outcome of e-business adoption. On the other hand, a maximum mean of 4.98 (Item D6) and its closest contender of 4.96 (Item D1) shows that majority of respondents acknowledged

improved speed and flexibility and improved customer retention as major outcomes of e-business adoption.

A standard deviation of 2 acceptable as it shows the absence of outliers. However, the most ideal standard deviation is below 1 (Drost, 2011). For section D of the questionnaire, the lowest standard deviation is 0.132 (Item D6) and the maximum standard deviation of 1.232(Item D3) both are below 2 indicating the absence of outliers in the data set. The minimum standard deviation of 0,132, indicates the least variation around the mean.

Table 4.24: Operational performance means and variability

Operational performance item	Item	Valid N	Mean	Minimum	Maximum	SD
Improved customer retention	D1	113	4.96	4	5	0.207
low employee turnover	D2	113	1.8	1	5	1.189
Productivity growth	D3	113	3.02	1	5	1.232
Revenue growth	D4	113	3.67	1	5	1.089
Reduced operational cost	D5	113	4.48	3	5	0.553
Improved speed and flexibility	D6	113	4.98	4	5	0.132

Source: Survey data

4.5 Reliability and relationship of the dimensions results

Subsequent to data analysis of the collected data, it is crucial to review the reliability and validity of the measuring scales. Cronbach Alpha and item to item correlation were used to assess the reliability and validity of measurements used in the survey.

Table 4.25 below shows the direction of strength of e-business technologies and business operational performance variables relationships. The results of the Pearson correlations reveal that coefficients are between -1 and +1 where negative values show inverse relationships while positive values signify positive relationships (Wilson, 2014). The coefficients values signify different strengths levels where $r < 0.39$ signify weak strength, between 0.4-0.69 signify a moderate strength, 0.7-0.99 signify a strong strength, 0 means there is no relationship at all and 1 is perfect relationship (Wilson, 2014).

Table 4.25 shows that there are varying correlations between items in question 8 and 11 of the questionnaires. The results of the Pearson correlation analysis show that there are a number of notable positive relationships among e-business technologies and various business operational performance.

The study also reveals that there is a weak positive relationship between computer use within an organisation and improved speed and flexibility of conducting business ($r=0.38$ and $p=0.01$). There is also a moderate positive relationship between mobile banking ($r=0.602$) and online banking ($r=.603$) at $p=0.01$ with improved speed of doing business.

Showing positive relationship as well is also mobile banking use and productivity growth. The results also show that there is a positive relationship between numerous e-business technologies and customer retention these are, the use of e-mails ($r=0.79$,

p=0.01), websites (r=0.63, p=0.01), Facebook (r=.46, r=0.01) and Instagram (r=0.45, p=0.01).

Table 4.25 also shows that there is no relationship with a zero correlation between online banking and low employee turnover and also between WhatsApp and improved speed and flexibility. There are also some notable negative correlations such as between internal computer system and productivity growth (r=-0.20, r=0.05) and similarly management and operations systems and improved customer retention (r=-.19, p=0.05). The majority of the relationships are generally weak ($r < 0.39$) this shows that the different sections of the instrument measured unrelated items, hence a valid research instrument.

Table 4.25: E-business and operational performance relationship

E-business technology	D1	D2	D3	D4	D5	D6
Internal Computer systems	.087	.102	-.201*	-.123	-.155	.380
E-mails	.794	.098	-.137	.570	.382	.225*
Websites	.627	.072	.250	.160	.230*	.535
Management & Operations systems	-.191*	.225*	.332	.165	.164	-.036
Online information storage systems	-.057	-.079	.176	.160	.392	.048
Facebook	.464	.014	-.067	-.018	-.123	.108
Instagram	.451	.056	.093	.127	.095	.044
Twitter	.594	-.127	-.004	.083	.199*	.037
WhatsApp	.053	.090	.187*	.103	-.038	.006
Mobile banking	-.047	-.080	-.305	-.162	-.097	.602
Online banking	-.100	-.001	.120	.138	.108	.603
Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Where D1-improved customer retention, D2-low employee turnover, D3-productivity growth, D4-revenue growth, D5- reduced operational cost and D6-improved speed and flexibility

Source: Survey data

Malhotra (2010) states that Cronbach's alpha scores closer to zero indicate lower reliability of the instrument used. The construct's Cronbach's alpha value of 0.67 and 0.61 exceeded 0.6 which is the acceptable threshold (Malhotra, 2010; Van Vuuren, Roberts-Lombard and Van Tonder, 2012). This, therefore, confirms the reliability of the measures used in this study.

Table 4.26: Reliability statistics

Questionnaire section	Cronbach's Alpha	N of Items
C	0.61	6
D	0.67	7

Source: Survey data

4.6 Hypothesis testing and regression

To investigate the null hypothesis all e-business drivers variables were entered as predictors against each of the operational performance variables. The predictors were management choices (C1), ICT skilled personnel (C2), growing firm size (C3), expected positive results C4), stakeholder pressure (C5), government support (C6), and ICT infrastructure evolution (C7) which are e-business adoption drivers. Multiple regression results for each dependent variable are presented in various tables below. R^2 determine the variability in dependent variable accountant for by independent variables where 1 indicates perfect predictor in variation and conversely 0 indicates none prediction in variation (Wilson, 2014).

Table 4.27 below shows multiple regression results for when improved customer retention is the dependent variable and divulges that 13.3% of observed variability in improved customer retention is explained by the seven independent variables ($R^2 = 0.133$, Adjusted $R^2 = 0.075$). However, the model is a predictor as $R^2 = 13.3\%$ and this percentage is closer to 0 than it is to 100%. ANOVA results show that independent variables collectively predict improved customer retention as $p < 0.05$ and the ratio of two mean squares F-test is $f(7,105) = 2.291$, $p=0.033$.

The only significant predictor in this model is expected positive results (C4), ($\beta=0.394$, $p=0.009$) this implies that for every 1-unit increase in expected positive results there is 0.39 units increase in improved customer retention.

The other remaining six predictors are statistically insignificant hence cannot significantly affect the outcome as their p-values are greater than the common alpha level of 0.05. Two of these predictors have negative Beta value C1 ($\beta= -0.071$, $p=0.475$) and C3 ($\beta= -0.109$, $p=0.288$). These negative beta-values indicate that for every 1-unit increase in both management choices (C1) and growing firm size (C3), there is 0.071 and 0.109 units decrease respectively in improved customer retention.

The combination of negative beta values and not statistically significant p values can be attributed to the fact that dependent variables not statistically depending on the constants. The other remaining statistically insignificant predictors are stakeholder pressure (C5) ($\beta= 0.043$, $p=0.679$), government support (C6), ($\beta= 0.030$, $p=0.748$) and ICT infrastructure evolution (C7) ($\beta= 0.177$, $p=0.065$).

These results mean for every 1 unit increase in each of these predictors there is a corresponding increase in improved customer retention equivalent to corresponding β -values. Therefore, there is a significant relationship between expected positive results and improved customer retention. Hence the alternative hypothesis is significant, and the null hypothesis is not accepted.

Table 4.27: Improved customer retention

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.364 ^a	.133	.075	.199		
ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.633	7	.090	2.291	.033 ^b
	Residual	4.146	105	.039		
	Total	4.779	112			
Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.716	.723		3.759	.000
	C1	-.011	.015	-.071	-.717	.475
	C2	.001	.017	.007	.061	.951
	C3	-.015	.014	-.109	-1.069	.288
	C4	.394	.149	.252	2.647	.009*
	C5	.006	.014	.043	.414	.679
	C6	.013	.041	.030	.322	.748
	C7	.070	.038	.177	1.868	.065
a. Dependent Variable: Improved Customer retention						
b. Predictors: (Constant) C1, C2, C3, C4, C5, C6, C7						

Source: Survey data

Table 4.28 below shows regression results for low employee turnover and the predictors C1, C2, C3, C4, C5, C6, and C7. The model is a moderate predictor as 23%

($R^2 = 0.23$, Adjusted $R^2 = 0.179$) variability in improved customer retention is caused by the independent variables. ANOVA results show that independent variables collectively predict low employee turnover as $p < 0.05$ and the ratio of two mean squares F-test is $f(7,105) = 4.49$, $p < 0.001$.

Of all the predictors only growing firm size (C3) is the statistically significant predictor ($\beta = 0.662$, $p < 0.01$) while the other remaining predictors are not statistically significant ($p > 0.1$). This indicates that for every 1 unit increase growing firm size in there is 0.662 units increase in low employee turnover.

Two of these not statistically significant predictors have negative beta values ICT skilled personnel (C2) ($\beta = -0.061$, $p = 0.555$) and ICT infrastructure evolution (C7) ($\beta = -0.045$, $p = 0.619$) hence implies negative relationships between dependent and independent variables.

The following are also not statistically significant as their p-values ($p > 0.05$) expected positive results C4) ($\beta = 0.074$, $p = 0.413$), stakeholder pressure (C5), ($\beta = 0.110$, $p = 0.269$) and government support (C6), ($\beta = 0.136$, $p = 0.127$).

For every unit increase in each of these predictors, there is a corresponding positive increase in low employee turnover equivalent to the corresponding beta value. However, the existence of statistically significant predictors ($p < 0.05$).

Therefore, the null hypothesis is not accepted and conclude that there is a positive relationship between e-business adoption and business operational performance.

Table 4.28: low employee turnover

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.480 ^a	.230	.179	1.077	

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	36.457	7	5.208	4.488	.000 ^b
	Residual	121.861	105	1.161		
	Total	158.319	112			

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.808	3.917		.717	.475
	C1	.039	.083	.044	.476	.635
	C2	-.055	.093	-.060	-.592	.555
	C3	.348	.074	.452	4.704	.000
	C4	.662	.806	.074	.822	.413
	C5	.086	.078	.110	1.111	.269
	C6	.340	.221	.136	1.539	.127
	C7	-.102	.204	-.045	-.499	.619

a. Dependent Variable: Low employee turnover as a result of e-business adoption
b. Predictors: (Constant) C1, C2, C3, C4, C5, C6, C7

Source: Survey data

Table 4.29 shows that 38.4% variability in productivity growth is caused by the independent variables ($R^2 = 0.384$, Adjusted $R^2 = 0.336$). ANOVA results show that independent variables collectively predict productivity growth as the $p < 0.05$ and the ratio of two mean squares F-test is $f(7,105) = 5.953$, $p < 0.001$.

Four of the predictors are statistically significant as their p values are $p < 0.05$ while three are statistically insignificant. The statistically significant predictors are management choices (C1) ($\beta = 0.274$, $p = 0.003$), growing firm size (C3) ($\beta = 0.239$, $p = 0.011$), expected positive results C4) ($\beta = -0.259$, $p = 0.003$) and stakeholder pressure (C5) ($\beta = 0.376$, $p < 0.001$).

These results show that for 1 unit increase in C1, C3 and C5 result in the following corresponding increases in productivity growth 0.274 units, 0.239 units, and 0.376 units. 1 unit increase in C4 result in productivity growth decrease by 0.259.

The other remaining not statistically significant predictors are ICT skilled personnel (C2) ($\beta = 0.121$, $p = 0.222$), government support (C6) ($\beta = 0.046$, $p = 0.592$) and ICT infrastructure evolution (C7) ($\beta = 0.104$, $p = 0.228$).

Therefore, there is a significant positive relationship between the following predictor's management choices, growing firm size, expected positive results as well as stakeholder pressure and productivity growth.

This consequently confirms the existence of a positive relationship between e-business adoption and operational performance, therefore, the null hypothesis is not accepted.

Table 4.29: Productivity growth

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.533 ^a	.384	.236	1.076		
ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	48.288	7	6.898	5.953	.000 ^b
	Residual	121.676	105	1.159		
	Total	169.965	112			
Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.855	3.914		2.773	.000
	C1	.252	.082	.274	3.060	.003
	C2	.114	.093	.121	1.228	.222
	C3	.191	.074	.239	2.576	.011
	C4	-2.413	.805	-.259	-2.996	.003
	C5	.308	.078	.376	3.956	.000
	C6	.119	.221	.046	.537	.592
	C7	.248	.204	.104	1.212	.228
a. Dependent Variable: Productivity growth as a result of e-business adoption						
b. Predictors: (Constant) C1, C2, C3, C4, C5, C6, C7						

Source: Survey data

Table 4.30 below shows that only 9.4% variability in revenue growth is accounted for by independent variables ($R^2 = 0.094$ and Adjusted $R^2 = 0.034$). ANOVA results show that independent variables collectively do not predict revenue growth as the value is $p > 0.05$ and the ratio of two mean squares F-ratio is $f(7,105) = 1.557$, $p = 157$. Management choices is the only statistically significant predictor (C1) ($\beta = 0.206$, $p = 0.043$). This implies that for 1 unit increase in management choices results in 0.206 units increase in revenue growth.

The remaining predictors are not statistically significant as their p values are all $p > 0.05$. These are growing firm size (C3) ($\beta = 0.046, p=0.661$), expected positive results C4) ($\beta = 0.075, p = 0.445$), stakeholder pressure (C5) ($\beta=0.109, p=0.310$), ICT skilled personnel (C2) ($\beta=0.124, p=0.266$), government support (C6) ($\beta=0.109, p=0.260$), and ICT infrastructure evolution (C7) ($\beta=0.064, p=0.509$). These beta (β) show positive very weak increases in revenue growth as a result of a 1 unit increase in each of these predictors. Two of these predictors share a similar increase, for every single unit increase in stakeholder pressure and government there 0.109 units increase in revenue growth. Nevertheless, the findings confirm the existence of a significant and positive relationship between e-business adoption and operational performance as there is the existence of statistically significant predictor ($p < 0.05$). This, therefore, means the alternative hypothesis is not rejected.

Table 4.30: revenue growth

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.307 ^a	.094	.034	1.071		
ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	12.493	7	1.785	1.557	.157 ^b
	Residual	120.392	105	1.147		
	Total	132.885	112			
Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.581	3.894		1.177	.242
	C1	.168	.082	.206	2.049	.043
	C2	.103	.092	.124	1.117	.266
	C3	.032	.074	.046	.440	.661

C4	.614	.801	.075	.766	.445
C5	.079	.077	.109	1.020	.310
C6	.249	.220	.109	1.132	.260
C7	.135	.203	.064	.663	.509

a. Dependent Variable: Revenue growth as a result of e-business adoption
b. Predictors: (Constant) C1, C2, C3, C4, C5, C6, C7

Source: Survey data

Table 4.31 below reveals that, 15.1% of observed variability in reduced operational costs is accounted for by the independent variables ($R^2 = 0.151$, Adjusted $R^2 = 0.095$) and the model is a predictor as $R^2 = 15.1\%$. ANOVA results show that independent variables collectively predict reduced operational costs as $p < 0.05$ and the ratio of two mean squares F-test is $f(7,105) = 2.677$, $p = 0.014$.

Three of the seven predictors are statistically significant, these are ICT skilled personnel (C2) ($\beta = 0.299$, $p = 0.006$), stakeholder pressure (C5) ($\beta = 0.240$, $p = 0.022$) and ICT infrastructure evolution (C7) ($\beta = 0.203$, $p = 0.032$). These beta values imply that for every increase by 1 unit in these predictors result in an increase in reduced operational costs by 0.299 units, 0.24 units and 0.203 respectively.

Three other predictors are not statistically independent with p values $p > 0.05$, expected positive results (C4) ($\beta = 0.022$, $p = 0.820$) and management choices (C1), ($\beta = 0.142$, $p = 0.147$). The last two predictors are also not statistically significant additionally they have negative beta values, government support (C6) ($\beta = -0.146$, $p = 0.152$) and growing firm size (C3) ($\beta = -0.074$, $p = 0.427$).

These negative beta values could be attributed to the fact that dependent variables not statistically depending on the constants. However, the existence of significant predictors with $p < 0.05$ confirms the relationship between e-business adoption and

operational performance. This, therefore, means the null hypothesis is not supported and hence not accepted.

Table 4.31: Reduced operational costs

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.389 ^a	.151	.095	.526		
ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.178	7	.740	2.677	.014 ^b
	Residual	29.017	105	.276		
	Total	34.195	112			
Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.475	1.912		1.295	.198
	C1	.059	.040	.142	1.461	.147
	C2	.126	.045	.299	2.789	.006
	C3	.052	.036	.146	1.444	.152
	C4	.090	.393	.022	.229	.820
	C5	.088	.038	.240	2.320	.022
	C6	.086	.108	.074	.797	.427
	C7	.217	.100	.203	2.170	.032
a. Dependent Variable: Reduced operational costs as a result of e-business adoption						
b. Predictors: (Constant) C1, C2, C3, C4, C5, C6, C7						

Source: Survey data

Table 4.32 below shows multiple regression results for the dependent variable improved speed and flexibility and the seven predictors C1 to C7. The model is a moderate predictor with 21.7% of variability in improved speed and flexibility accounted for by the predictors ($R^2 = 0.217$, Adjusted $R^2 = 0.158$). ANOVA results show that independent variables collectively predict reduced operational costs as $p < 0.05$ and the ratio of two mean squares F-test is $f(7,105) = 1.98$, $p = 0.035$.

ICT skilled personnel (C2) ($\beta = -0.227$, $p = 0.04$) and ICT infrastructure evolution (C7) ($\beta = 0.234$, $p = 0.016$) are both statistically significant predictors although they have opposing impacts on the dependent variable. On one hand, for every 1 unit increase in ICT infrastructure evolution there is 0.243 units increase in improved speed and flexibility on the hand 1 unit increase in ICT skilled personnel result in 0.227 units decrease in the dependent variable.

The other remaining predictors are all not statistically significant as their p values are $p > 0.05$. management choices (C1) ($\beta = 0.124$, $p = 0.214$), growing firm size (C3) ($\beta = 0.086$, $p = 0.406$), expected positive results C4) ($\beta = 0.052$, $p = 0.592$), stakeholder pressure (C5) ($\beta = 0.037$, $p = 0.730$) and government support (C6) ($\beta = 0.050$, $p = 0.603$).

These beta values are very low implying slight positive unit changes in improved speed and flexibility as a result of 1 unit increase in each of these predictors. Although some predictors are not statistically significant there are two significant predictors with p values $p < 0.05$. Therefore, the researcher does not accept the null hypothesis.

Table 4.32: improved speed and flexibility

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.342 ^a	.217	.158	.129		
ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.229	7	.033	1.980	.035 ^b
	Residual	1.735	105	.017		
	Total	1.965	112			
Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.952	.467		10.593	.000
	C1	.012	.010	.124	1.250	.214
	C2	-.023	.011	-.227	-2.077	.040
	C3	.007	.009	.086	.834	.406
	C4	.052	.096	.052	.538	.592
	C5	.003	.009	.037	.346	.730
	C6	.014	.026	.050	.521	.603
	C7	.060	.024	.234	2.448	.016
a. Dependent Variable: Improved speed and flexibility as a result of e-business adoption						
b. Predictors: (Constant) C1, C2, C3, C4, C5, C6, C7						

Source: Survey data

In each of the above models, there are significant predictors to each of the dependent variables with p values of $p < 0.05$. Therefore, the null hypothesis is not accepted and concludes that there is a positive relationship between e-business adoption and business operational performance.

4.7 Summary

SME and respondents' characteristics except management's educational level does not affect e-business adoption. Management choices, expected positive results and ICT infrastructure evolution are the major drivers of e-business adoption in Windhoek manufacturing SMEs. Firm size and stakeholder pressure are weaker drivers, while the availability of ICT skilled personnel and government support were ruled out as possible drivers. There is a high adoption of the general use of computers, emails, Facebook, and financial services platforms and low adoption of management and operations systems, online information storage and most social media networks. Manufacturing SMEs in Windhoek are still at the infancy stage of e-business adoption hence low e-business adoption level. Multiple regression analysis was used to test the hypothesis and results show that there is a positive relationship between e-business adoption and business operational performance.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 introduction

E-business adoption can go a long way towards improving business firms' operational performance and overall business performance (Ilin, Ivetić and Simić, 2017). The main objective of the study was to examine the impact of e-business adoption on the operational performance of manufacturing SMEs in Windhoek. The preceding chapter focused on the field study results and discussions. Chapter 5 focuses on the entire study's conclusions, provides recommendations on e-business adoption and also avails possible suggestions for further study.

5.2 Conclusions of the study

The conclusions of this study are clustered according to the specific study objectives. These specific objectives were developed in order to understand the main research objective. The E-business assimilation model was found to be the most relevant model to be used in order to achieve the specific research objectives. The model provides the most suitable framework for the study because of its focus on each business firm and individual(owner/manager)'s: eagerness to adopt, the actual adoption, usage and measuring the e-business success. The specific objectives and their corresponding conclusions grounded on the primary data results discussed in Chapter 4 are as follows:

- **To determine e-business technologies adopted by manufacturing SMEs in Windhoek**

The study focused on the firms' adoption of e-business technologies identified to be most prevalent across the world as per the secondary data reviewed in Chapter 2. Although literature suggests that there is great potential for SMEs adopting e-business

technologies, the study shows that the actual adoption of these technologies differs from one firm to another.

The study established that the most frequently adopted e-business technologies among manufacturing SMEs in Windhoek are: general use of computers, emails, Facebook, and financial services platforms. On financial services technologies, online banking is highly adopted ahead of mobile banking among these SMEs. There is low adoption of high-end e-business techniques such as management and operations systems, online information storage and recently launched social media networks. Facebook is the highly adopted social media platform ahead of WhatsApp, Twitter and Instagram. The results show that the manufacturing SMEs in Windhoek are still at the infancy stage regarding e-business adoption and hence more effort needs to be put by relevant stakeholders to ensure massive e-business acceptance and adoption by SMEs.

- **To determine the level of e-business adoption by manufacturing SMEs in Windhoek**

The E-business assimilation model also focuses on the actual usage of e-business; hence this was the basis for this second objective which concentrates on the level of e-business adoption. Although most adopters use these technologies daily than occasionally, unlocking maximum potential by doing so, the actual adoption is still low. The study established that there is a high adoption of low-end e-business technologies and low to medium adoption of high-end e-business technologies. Overall, the research reveals that manufacturing SMEs in Windhoek are still at the infancy stage of e-business adoption and therefore the low e-business adoption levels.

- **To identify major drivers of e-business adoption by manufacturing SMEs in Windhoek**

The E-business assimilation model suggests the evaluation of both firm and individual readiness to facilitate acceptance and adoption of e-business, and hence this was the basis for this study objective. To examine firm and/or individuals' keenness to adopt e-business, e-business adoption drivers were examined. The research established that management choices, expected positive results and ICT infrastructure evolution are the major drivers of e-business adoption in Windhoek manufacturing SMEs. The research also showed that growing firm size and stakeholder pressure are weaker drivers of e-business adoption as they had almost equal respondents either in agreement or in disagreement.

The research ruled out the availability of ICT skilled personnel within a firm and government support as possible e-business drivers among Windhoek manufacturing SMEs. This finding painted an unfavorable picture on the government of Namibia, as respondents collectively agreed that the government is not directly helping SMEs adopt e-business technologies whereas in other countries the governments are both catalysts and regulators in SMEs e-business adoption (Ilin, Ivetić and Simić, 2017; Chang and Graham, 2012).

The research findings also showed that SME owners or managers' biographic characteristics such as age, gender, or title do not have any influence in e-business adoption. However, management or owner's level of education was found to be the only biographic factor that influenced e-business adoption. The study similarly concluded that manufacturing SMEs' size, age in business and specific manufacturing sector do not affect e-business adoption.

- **To examine the relationship between e-business adoption and operational performance for manufacturing SMEs in Windhoek**

Lastly, the e-business assimilation model believes in measuring e-business success, hence the study assessed the relationship between e-business adoption and SMEs' operational performance. The study established that there is a positive relationship between e-business adoption and business operational performance. Based on the research findings there is a need for SMEs to adopt e-business as this yields a positive impact on the business operational performance, leading to positive overall business performance and SMEs' growth. In conclusion, the results from the study suggest that the proposed e-business assimilation model is applicable to the research's discussion on e-business adoption among manufacturing SMEs in Windhoek.

5.3 Recommendations

Based on the above conclusions, the researcher recommends the following:

- Government should set up entrepreneurship ICT based hubs where manufacturing SMEs are not only accommodated and exposed but also train owners and managers;
- Government should set up manufacturing hubs with an ICT enabling environment such as availability of subsidised wi-fi and additionally avail relevant infrastructure and computers;
- Government should also facilitate training of SME owners and managers on e-business adoption and other relevant 4th Industrial revolution-based business practices;
- The government should provide information adapted to manufacturing SMEs' needs through various means and platforms such as SMEs' hubs, publications, and workshops;
- Government should encourage and fund research on e-business to stay up to date and be guided by current data in order to make relevant policies, provide an enabling environment and disseminate timely information;

- The transfer of scientific and technological information from universities to SMEs is very much needed to make SMEs competitive and also to fill up the technological needs, this worked in Japan - a collaboration between academics and SMEs (Syed and Shaikh, 2012);
- Introduce ICT curriculum in primary and high schools to encourage acceptance at a younger age for easier adoption and use in adult life. Also, equip ICT knowledge and skills to all graduates and not just the ones in IT related fields; and
- SMEs to work in consultation with relevant bodies to develop e-business strategies that are ideal for their operations and business environment.

5.4 Recommendations for further research

Based on the reviewed literature in Chapter 2, other countries, especially first world countries are benefitting from e-business adoption, hence the following suggestions are made for future research to maximise e-business adoption:

- As the research was limited to Windhoek only, further research should consider a wider geographical reach, such as countrywide research or even a regional research such as Southern African Customs Union (SACU) or Southern African Development Community (SADC) regions;
- Future studies can also conduct a comparative study between Namibia and other countries which have SMEs that are advanced in e-business adoption and usage;
- The current study focused only on manufacturing SMEs, hence future studies can include other SME sectors beyond just manufacturing; and
- The current study used cross-sectional data, making it impossible to study previous and upcoming practices on the same subjects. Although the study brought to light useful insights obtained from the research's time analysis, it would be great if future researchers seek longitudinal data over the years and document significant development on e-business adoption and the subsequent effects on manufacturing SMEs.

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APPENDIX 1 REQUEST TO PARTICIPATE IN ACADEMIC RESEARCH

Dear Participant

Request to Participate in Research

I am a Master of Business Administration (MBA) - Management Strategy student from the Namibia Business School: University of Namibia. I am currently conducting research, entitled: **An examination into the impact of e-business adoption on the operational performance of manufacturing SMEs in Windhoek.** This study is fully endorsed by the University of Namibia Management and my supervisor is DR E Woyo.

The study will add to the scarce relevant literature regarding the adoption of electronic-business (e-business) in Namibia. SME owners and managers may gain more understanding of e-business hence improve decision making and improve SMEs effectiveness. The government of Namibia and related bodies may use the findings to shape skills development programmes, policies and infrastructure development that allow e-business adoption by SMEs. Your participation will form a critical part of the study.

Your shared knowledge and experiences will be valued to me hence your identities and privacy will be respected and protected by the use number codes instead of names. A summary of my findings will be provided upon your request. If you have any queries, please do not hesitate to contact me.

In order to assist in my research, you will be required to complete a questionnaire with the researcher's assistance, this may take approximately 10 minutes of your time.

Kindly specify where and when you're available to go through the questionnaire with the researcher at your offices or over the phone at your earliest convenience.

Find attached documents, the questionnaire, research permission letter from the university and consent form.

I thank you in advance for your kind assistance and consideration.

Yours sincerely,

Lee Tirigu - Researcher

Contact details: 0817 728 539 / leetirigu@gmail.com

APPENDIX 2 RESEARCH PERMISSION LETTER



27 June 2019

TO WHOM IT MAY CONCERN

Re: MBA Management Strategy, Student – Ms Lee Tirigu, Student No:218255603

As part of our Masters Programme, students are expected to submit a research report after completion of their course-work. They need to explore in detail, some concepts and issues pertaining management strategies. To do that effectively, they need to conduct interviews and obtain practical examples.

Ms Tirigu has chosen your organization to approach for information. It is against this background that I wish to kindly request you to assist Ms Tirigu with the information she requires. Accept our assurance that the data will be used for academic purposes only. A copy of the completed document will be available at the Namibia Business School for perusal. Her research synopsis indicates that her topic touches on "An examination into the impact of e-business adoption on operational performance of manufacturing SME's in Windhoek"

Your kind assistance is highly appreciated.

Yours sincerely

Greenfield Mwakipesele, Dr
Research Co-Ordinator
Namibia Business School
University of Namibia
Tel: +246 61 413 500
Fax: +246 61 413 512
Email: mwakipp@nbs.edu.na



390 Mandume Ndemufayo Ave. - Private Bag 18004 - Florisspark - Windhoek - Website: www.nbs.edu.na
Tel: +264 (61) 413000 - Fax: +264 (61) 413512 - E-mail: info@nbs.edu.na

APPENDIX 3: CONSENT FORM

Topic: An examination into the impact of e-business adoption on the operational performance of manufacturing SMEs in Windhoek

CONSENT AGREEMENT FOR PARTICIPATION

I am an MBA Management Strategy Student at Namibia Business School: University of Namibia. The aim of this study is to examine the impact of e-business adoption on operational performance of manufacturing SMEs in Windhoek. You can help in this study by consenting to the completion of the questionnaire. As a participant, you will be required to express your views regarding the subject matter.

If you are willing to participate in this study, kindly complete your details below:

Name of Participant:

Signature:

Date:

I understand that I am free to withdraw my consent and discontinue my participation at any stage without prejudice. I also understand that all materials in this study are confidential. I agree that the research data gathered for this study may be published, provided that neither my company nor myself are identified.

Signature.....

APPENDIX 4: QUESTIONNAIRE

Please provide the following information (Please tick where appropriate✓)

Section A Respondent and Firm biography

1)Title	2)Gender	3)Age category			
Owner	Male	18-19		40-49	
Manager	Female	20-29		50-59	
		30-39		above 60	

4)What's your highest qualification?

No school		Tertiary Certificate / Diploma	
Primary school		Bachelor's degree	
High school		Master's degree or above	

5) In which manufacturing sector is your business?

Manufacturing sector			
Non-metallic minerals		Metals	
Food and beverages		Chemicals	
Paper and plastics		Wood	
Leather and textiles			

6) How many years has the business been in operation?

2 to 5	6 to 10	11 to 15	16 to 20	
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7) How many permanent employees do you have?

1 to 10	11 to 30	31 to 100	
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Section B: E-business technologies

8) Choose all of the following technologies in use at your firm. Indicate Yes to the technologies used at your firm and No to the ones not in use at your firm.

E-business technology	Yes	No
Internal computer system (no internet)		
Emails		
Websites		
Online information storage systems		
Management and operations systems		
Facebook		
Instagram		
Twitter		
WhatsApp		
Mobile banking		
Online banking		

9) Choose any/all of the following e-business technologies in use at your firm. indicate how often do you use each adopted e-business technology

E-business technology	Frequency of use		
	Daily	weekly	Monthly
Internal computer systems (no internet)			
Emails			
Websites			
Online information storage systems			
Management and operations systems			
Facebook			
Instagram			
Twitter			
WhatsApp			
Mobile banking			
Online banking			

Section C: E-business drivers

10) Drivers of e-business are presented on a Likert scale, where 1=Strongly disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly agree. You are Required to tick one option on each statement to express your opinion.

E-business adoption Driver	1	2	3	4	5
Management choices					
ICT skilled personnel					
Growing firm size					
Expected positive results					
Stakeholder pressure					
Government support					
ICT infrastructure evolution					

Section D: Operational performance

11) Improvements in business operations as a result of e-business adoption are presented on a Likert scale where, 1=Strongly disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly agree. Pick one appropriate option per each statement.

Operational performance results	1	2	3	4	5
Improved Customer retention					
Low employee turnover					
Productivity growth					
Revenue growth					
Reduced operational costs					
Improved speed and flexibility					

The End: Thank you for your participation.

APPENDIX 5: LANGUAGE EDITING CERTIFICATE

Dr.GM

The Rev. Dr. Greenfield Mwakipesile

ThD, MBA, HBS | mwikipg@outlook.com

CONTACT

PO Box 98539,
UNAM,
Namibia

LANGUAGE & COPY-EDITING CERTIFICATE

30th December 2019

RE: LANGUAGE, COPY-EDITING AND PROOFREADING OF LEE TIEGU'S THESIS FOR THE MASTER OF BUSINESS ADMINISTRATION DEGREE OF THE NAMIBIA BUSINESS SCHOOL OF THE UNIVERSITY OF NAMIBIA

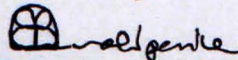
This certificate serves to confirm that I copyedited and proofread LEE TIEGU'S Thesis for the MASTER OF BUSINESS ADMINISTRATION DEGREE entitled: AN EXAMINATION INTO THE IMPACT OF E-BUSINESS ADOPTION ON THE OPERATIONAL PERFORMANCE OF MANUFACTURING SMEs IN WINDHOEK NAMIBIA

I declare that I professionally copyedited and proofread the thesis and removed mistakes and errors in spelling, grammar, and punctuation. In some cases, I improved sentence construction without changing the content provided by the student. I also removed some typographical errors from the thesis and formatted the thesis so that it complies with the University of Namibia's guidelines.

I am a trained language and copy editor and have edited many Postgraduate Diploma, Masters' Thesis, Dissertations and Doctoral Dissertations for students studying with universities in Namibia, Zimbabwe, Eswatini, South Africa and abroad. I have also copy-edited company documents for companies in the region and abroad.

Please feel free to contact me should the need arise.

Yours Sincerely,



The Rev. Dr. Greenfield Mwakipesile



greenfield.mwakipesile



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Dr. Greenfield
Mwakipesile