VAAL UNIVERSITY OF TECHNOLOGY

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Measuring Success of Information System in Small and Medium Enterprises in Gauteng

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ABSTRACT

The impacts of information systems (IS) are often indirect and influenced by human, organisational, and environmental factors, therefore measurement of information systems (IS) success is both complex and elusive. Researchers have created models for success emphasizing the need for better and more consistent success metrics. This study endeavoured to measure IS success in SMEs in Gauteng, South Africa in order to find out its impact on these businesses. This research proposed a comprehensive multidimensional model of measuring success of information system in SMEs which suggests that system quality, information quality, service quality, intention to use, user satisfaction, use, self-efficacy, individual benefit/impact, use and organisational benefits/impact are success variables to be used. Online survey questionnaire was distributed to one hundred and twenty-six (126) participants. The data collection instrument fulfilled the reliability and validity tests. The hypotheses were tested using regression analysis. The results enabled the derivation of a generic formal measure of IS success in SMEs with organisational benefits/impact variable as the subject of the formula. The formula can be used by SMEs to measure the success of IS in their respective organisations.

LIST OF ABBREVIATIONS

Acronym	Descriptions
IS	Information System
IT	Information Technology
D&M	Delone and MacLean Model
TAM	Total Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
PU	Perceived Usefulness
SI	Social Influence
BI	Business Intelligence
EF	Entity Framework
EE	Effort Expectancy
VUT	Vaal University of Technology
ICT	Information Communication and Technology
FA	Factor Analysis
TTF	Task Technology Fit
SMEs	Small and Medium Enterprises
PE	Performance Expectancy
SPSS	Statistical Package for the Social Sciences Version 26
IU	Intention to Use
IQ	Information Quality
SysQ	Service Quality
US	User Satisfaction
IBI	Individual Benefit/Impact
SE	Self-Efficacy
OBI	Organisational Benefit/Impact

U	Use
SQ	Service Quality
KMO	Kaiser-Meyer-Olkin
KMS	Knowledge Management System

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STATEMENT OF ORIGINAL AUTHORSHIP

This research study is submitted to the Vaal University of Technology in fulfilment of the requirement for the master's degree in IT. This research study represents my own work and contains no material which has been previously submitted for a degree or diploma at this University or any other institution, except where acknowledgement is made.

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CHAPTER ONE: INTRODUCTION

1.1 Purpose of the Study

To measure the success of information system in small and medium enterprises (SMEs) in Gauteng. To analyse the importance of measuring success of information system in small and medium enterprises as the way to enhance the bottom-line results of SMEs.

1.2 Background of SME Definitions

Almost every company we know of today began as an SME. SMEs globally have a very significant contribution to the provision of goods and services to the society. Without SMEs, big companies may not be able to meet the demand for goods and services in an expanding customer base (Katua, 2014). SMEs in Malaysia can be labeled into 3 components: (1) standard enterprise, (2) production and (3) agricultures. The standard enterprise quarter consists of construction, wholesaling and retailing, delivery and storage, enterprise offerings and sports, and imparting offerings including resort and restaurant. The essential sports within the production quarter encompass processing and manufacturing of uncooked materials. Meanwhile the agriculture quarter consists of rubber, oil palm, paddy, coconuts, fruits, and vegetables. From the 3 components: the producing quarter emerged because the maximum vital element for SMEs in Malaysia (Omar et al., 2019).

Currently there is no accepted worldwide definition of SMEs. An analysis of the definition of an SME shows that it depends on who is defining it and from where they are defining it. The same person will define an SME differently depending on where they are (Katua, 2014). SMEs are defined by number of workers employed, capital employed and sales turnover (Mwangi et al., 2013). They classify SMEs by the number of employees and by the value of their assets. The classification of SMEs by size is relevant to sector. SMEs additionally have restricted get

right of entry to expertise, whether or not they need to draw and hold humans with unique talents, broaden their very own academic or education systems, or have their human sources specialize with inside the present organisational structure. Lack of expertise, thinking about the needs of surroundings and enterprise, even if working within the nearby market, may be an extreme hassle of small enterprise nowadays. This refers each to formal training and to enterprise enjoy in general (Kruja, 2013). A firm of a given size could be small in relation to one sector where the market is large and there are many competitors, whereas a firm of similar proportions may be considered large in another sector with fewer players or generally smaller firms within it (Katua, 2014).

It may be appropriate to define size by the number of employees in some sectors but more appropriate to use turnover in others. Across governments, it is most usual to measure size according to numbers of full-time employees or their equivalent. Different countries define SMEs differently, for example, in Canada the term SME refers to businesses with fewer than 500 employees (Katua, 2014). They further define a small business as one that has fewer than 100 employees (if the business is a goods-producing business) or fewer than 50 employees (if the business is a service-based business). Small and medium enterprises (SMEs) cover a wide spectrum of industries and play an important role in both developed and developing economies (Levy and Powell, 2000). South Africa is no exception and SMEs occupy a prominent position in the planned development of the South African economy (Levy and Powell, 2000).

Traditionally the success of Information Systems (IS) has been studied in the context of large organisations with a focus on systems that have been developed in-house (Sharma and Bhagwat, 2006). A firm that has more employees than these cut-offs but fewer than 500 employees is classified as a medium-sized business. Generally, in Canada an SME is any business establishment with 1 to 499 employees and less than $50 million in gross revenues.

In Germany an SME has a limit of 250 employees while in Belgium it has a limit of 100 employees (Katua, 2014). Based on personnel variety and general turnover, Malaysia adopts barely comparable definition as being use through United Kingdom, United States of America, Japan, China and Korea. Previously Malaysian SMEs had been described as corporations with income turnover now no longer exceeding 25 million or employment now no longer exceeding 150 employees for production and income turnover now no longer exceeding 5 million or employment now no longer exceeding 50 employees for offerings and different sectors (Salikin et al., 2013).

In New Zealand a small business has 19 employees or fewer. In the United States (U.S.A) a small business refers to those with fewer than 100 employees, while medium-sized business refers to those with fewer than 500 employees. Thus in Malaysia SMEs are grouped into Micro, Small, or Medium based on either the numbers of people a business employs or on the total sales or revenue generated by a business in a year (Katua, 2014). The South African SMEs have been consistently outperforming large industries on crucial parameters such as global competition, this has placed a considerable pressure on SMEs to improve on cost and efficiency to provide value-added services to meet market demand leading to a need for them to re-examine their competitive strategies (Sharma et al., 2008). Since DeLone and McLean have developed their model of IS success there has not been much research on the topic of IS success as well as extensions, tests, understanding and user satisfaction of their model in the past three years (McLean and Delone, 2003) .

1.3 Problem Statement

In 2008, organisations continued to increase spending on information technology (IT) and their budgets continued to rise, even in the face of potential economic downturns (Peter et al., 2008). However, fears about economic conditions and increasing competition create pressure to cut

costs which require organisations to measure and examine the benefits and costs of technology (Peter et al., 2008). Naturally, organisations are interested in knowing the return on these investments. The impacts of IT are often indirect and influenced by human, organisational, and environmental factors, therefore measurement of information systems (IS) success is both complex and elusive. Researchers have created models for success emphasizing the need for better and more consistent success metrics (Peter et al., 2008). This study endeavours to measure IS success in SMEs in Gauteng, South Africa in order to find out its impact on these businesses (McLean and DeLone, 1992).

1.4 Research Objectives

The exploration targets of this examination have been detailed as follows:

(i) To explore or investigate what has been done in the literature to measure information system success in organisations.

(ii) To propose a model that can be used to measure the success of IS in SMEs Gauteng South Africa.

(iii) To measure the success of IS of SMEs using the proposed model.

1.5 Research Questions

This research is a continuation of other exploration work that has been carried out in South Africa that is not restricted to user's insights on estimating the accomplishment of IS in SMEs. In this manner the accompanying exploration questions are recorded beneath:

Primary research question is as follows:

How can the success of an information system in the small and medium enterprises be measured?

Secondary research questions are as follows:

i. What has been done in the literature to measure information system success in the organisation?

ii. What model can be proposed to measure information system success in SMEs Gauteng, South Africa?

iii. How can the success of an information system be measured using the proposed model?

1.6 Significance of the Study

This research will be of the extraordinary significance for people to know and comprehend the apparent helpfulness and significance of estimating the accomplishment of IS in SMEs. The investigation endeavoured to add to the collection of writing on the job of estimating achievement of IS concentrates in South Africa. Moreover, the examination will contribute hypothetically nearby estimating accomplishment of IS models. The field work has delivered sufficient proof of the significance of saw value and saw significance of estimating achievement of IS instruments considering it is assuming a significant part in the IS models. This investigation is critical in light of the fact that it has given complete users insights on estimating the accomplishment of IS in SMEs in Gauteng.

1.7 Assumptions

The accompanying suppositions have been made in the examination:

- The all-out number of respondents was adequate to acquire satisfactory information.
- Participants honestly and really reacted to the study survey.
- Some members probably won't react to the survey.

1.8 Structure of the Dissertation

This study consists of five chapters discussed below:

Chapter One: Introduction

The introduction describes the research problem, research questions and lays out the reasoning behind it. This reasoning is sometimes called a theoretical argument. It justifies the topic of measuring the success of information system on SMEs in South Africa. Chapter one of this study already presented.

Chapter Two: Literature review

Chapter two of this research study reviewed what has already been written in the field of the topic. The literature supports the theoretical argument being made and demonstrate that the author has a grasp of the major ideas and findings that pertain to the topic. The section gives a short outline of the examination foundations. This chapter covers the following sections: Introduction, Brief explanation of SMEs, SMEs in the information system architecture, The roles of SMEs, Importance of SMEs, Information system success, Information system success measure in small and medium enterprise, The problem of measuring success, strategic benefit of information system success, The contingence approach of information system success measure on SMEs, The development model of information system success, Organising literature review and Conclusion.

Chapter three: Research Methodology

This chapter discussed sufficient detail about the methodology used to replicate the study. This chapter often followed a honeycomb model. More details of this chapter is already discussed in chapter three.

Chapter Four: Research Results and Analysis

In this section the outcomes are created and analysed utilising a suitable instrument, IBM SPSS version 26. The outcomes are introduced in figures and plain organisation. Examination is done in the review survey. The exploration discoveries are incorporated with the outcomes from the connected examination in the writing audit.

Chapter five: Conclusions and recommendations

In this chapter the conclusions derived from the findings of this study, the experiences of measuring the success of IS in SMEs around Gauteng are described. This section centres around responding to the examination questions and introducing suggestions for considering users' insights on estimating the accomplishment of IS framework on SMEs in South Africa.

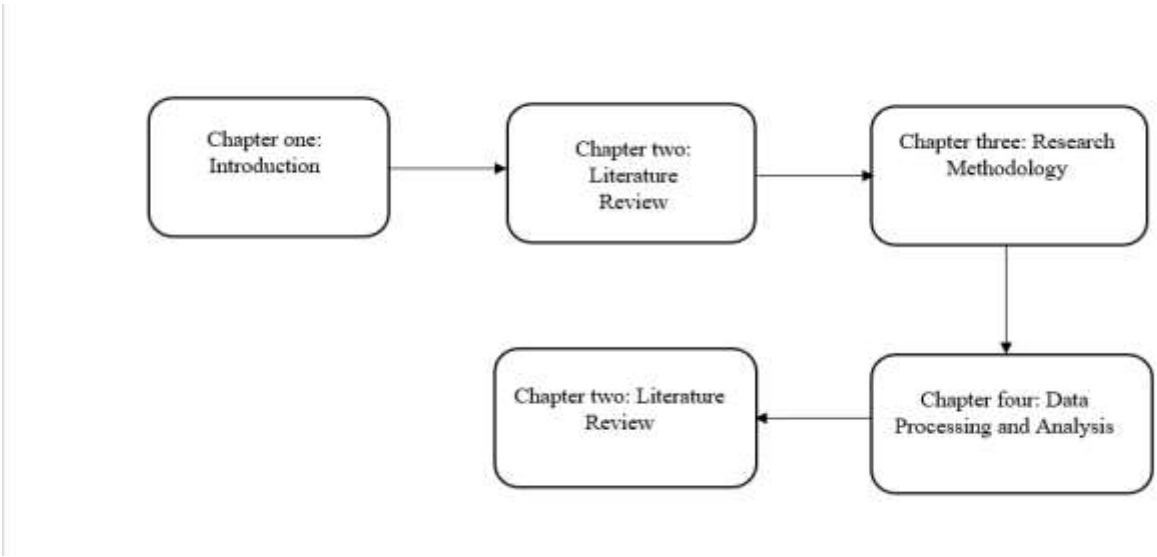

Figure 1.1 Processes of outlining the study

Source: Researcher compilations

CHAPTER TWO-LITERATURE REVIEW

2.1 introduction

Because of the popularity of the Delone & Maclean (DM) model in the academic literature, it seemed appropriate to organise the studies of IS success measure in SMEs using the taxonomy

of (McLean and Delone, 2003). The literature will help the peruser to get comfortable with the significant estimates used to quantify the achievement of IS in SMEs. The part gives a short outline of the exploration foundations. This chapter covers the following topics: brief explanation of SMEs, SMEs in the information system architecture, the roles of SMEs, importance of SMEs, information system success, information system success measure in small and medium enterprise, the problem of measuring success, strategic benefit of information system success, the contingence approach of measuring information system success on SMEs, the development model of information system success, organising literature review and conclusion.

2.2 Small and Medium Enterprises (SMEs)

Small and medium enterprises (SMEs) are vital engines of employment, innovation and growth. There is consensus on differentiating characteristics for SMEs from the larger counterparts which have important implications for the success of IS implementation initiatives. These include organisational structure, management and decision-making processes (Alshardan et al., 2013). Small and medium enterprises (SMEs) are specific from huge organisations. These variations in most cases relate to such defining SME traits as a reactive, fire-combating mentality, resource limitations, casual strategies, and bendy structures. As a consequence, they have a tendency to have a failure fee better than that of huge organisations (TerzIovski, 2010). A big majority of companies global are SMEs, and that they play a sizable function within the economy. There is an extensive consensus that a colourful SME region is one of the most important using forces within the improvement of a marketplace economy. SMEs stimulate personal possession and entrepreneurial skills, are bendy and might adapt quick to converting marketplace call for and deliver situations, generate employment, assist diversify monetary activity, and make a sizable contribution to exports and trade. Even within

the evolved marketplace economies SMEs account for a big proportion in output and employment (Forkan, 2010).

They contrary organisational structure to large organisations, SME structure is generally centralized and informal while this structure has the advantage of flexibility in adapting to market changes, it can be criticized for its fragility given its difficulty in function segregation. Analysing the situation both before and during IS implementation through a combination of interviews, observation and document analysis, research finds sizeable gaps between the assumptions and requirements built into IS design, and the actual realities of the client organisation (Alshardan et al., 2013). Modern technology has substantially decreased the fee of statistics and the abilities to take part within the international economic system. In fact, there may be adequate proof that SMEs has now no longer handiest flourished in-home economies, however that their global presence has grown as nicely. The possibilities and demanding situations dealing with SMEs on this position are nicely known (Ndiaye et al., 2018).

SMEs are often resource-poor, and resource-based theory indicates that they will need different competences to cope with scarce resources. They may also have to rely more on external resources and thus a different set of competences are required particularly on externally focused ones. Furthermore organisation theory indicates that SMEs have a fatter or simpler structure and thus internal coordination is less of an issue as there is close proximity between all staff including owners and employees (Alshardan et al., 2013). Hence SMEs have less need for an internal competence that links IS staff with others as in some frameworks. This also touches on the concept of internal power where politics within the firm can be a common source of concern within large organisations (Broembsen et al., 2005). Thus, SMEs may need different competences to manage this effectively.

Although this research's literature review identified five typologies of IS resources and competences, it seemed likely that some aspects would be different for SMEs (Caldeira and Ward, 2002). Furthermore, no research had examined the applicability of the existing typologies in the SME environment. However, some research of SMEs has used resource-based model and demonstrated its value in studying SMEs, including IS management involvement and IS technical knowledge and skills (Delone and McLean, 2003). This research therefore attempted to create a resource-based typology for SMEs. The research proposed a taxonomy and an interactive model (hereafter referred to as the "D&M IS Success Model") as frameworks for conceptualizing and operationalizing IS success. Since 2003 nearly 300 papers in refereed journals have referred to and made use of this IS Success Model (Delone and McLean, 2003).

2.3 SMEs in the information system architecture

SMEs in the proposed architecture are a cluster of small- and medium-sized enterprises that cooperate and collaborate with each other on certain common business objectives to gain competitive edge in the global market. Common business objectives can be similar types of operation, markets, products or services offered by the cluster of SMEs situated in a particular location (Bhagwat and Sharma, 2007). The expression of structure in companies become inflated through IT human beings within the IT enterprise that become used to lessen the complexity of IT structures and packages and employer integration. The important concept of structure is aligning the version or shape of an item with its use or characteristic in addition to with growing order, consistency, uniformity and economy. The time period of structure in enterprise layout, refers to systems, meta model and methodologies that allows enterprise functioning as a socio-technical system (Dehbokry and Chew, 2015).

SMEs are the small business operating units with certain constraints in terms of finance, market accessibility, technical know-how and other resources. Problems related with these constraints

are addressed here, by designing a formal IS architecture based on the theme of cooperation and collaboration (Bhagwat and Sharma, 2007). Information Architect become normally recognized with the layout of virtual environments, normally for the Internet. Information Architect become delineated within the context of then and there rising net technologies, as each the system and the final results of designing online environments that permit customers to discover statistics of interest (Almeida et al., 2020). They describe SMEs IS architecture as direct contact at various layers and connectivity levels with the IS architecture so that relevant information can be retrieved and used to achieve competitive business gains. Further information can be shared among SMEs in their mutual interests and hence their interconnectivity with each other is of vital importance in the architecture (Bhagwat and Sharma, 2007).

2.4 The roles of SMEs

The presence of SMEs in all sectors of the economy would signify their critical role in steering development. However, according to Muriithi (2017), there is very little information from literature on specific roles and contributions of SMEs toward economic growth. This may be related to the fact that small and medium enterprises are visible in all sectors and it is difficult to distinguish them from a few large companies (Haleem et al., 2019). SMEs are the catalyser of the economy of South African country still as in different developed and developing countries. As they need a lot of versatile production opportunities compared to giant enterprises, they adapt to the changes in demand in an exceedingly short time and reach full competition conditions quickly (Erdin and Ozkaya, 2020). So, they contribute to value, employment, productivity and bourgeois coaching. SMEs are the most actor in increasing employment. Therefore, SMEs are seen as a key part in achieving the growth and employment targets (Erdin and Ozkaya, 2020). The contribution of these SMEs can be summarized in a few

key points, as follows: Small and medium enterprises solve employment problems of the country. Small and medium enterprises make a significant contribution to the Gross Domestic Product (GDP) - of the country. Small and medium enterprises provide a valuable contribution to the development of large enterprises. Small and medium enterprises make a significant contribution also in export-import of the country (Morina and Gashi, 2016).

additionally, SMEs contribute greatly to the advance and usage of latest technologies because of their innovative and versatile structures. SMEs have special importance for the South African's economy. Therefore, the African country supports SMEs so as to preserve its versatile and innovative structures and use them as a competitive part (Erdin and Ozkaya, 2020). The contribution of SMEs to the economy is usually gathered underneath five main topics: employment creation; quick adaptation to new things with its flexibility feature; encouraging entrepreneurship; product differentiation through shop production; operating as sub-industry in giant enterprises. Among of these options, the foremost necessary feature of SMEs is their contribution to employment. In general, SMEs mistreatment labor intensive production techniques are very necessary in terms of social still as economically (Fiseha and Oyelana, 2015).

2.5 Importance of SMEs

Small and medium-sized enterprises (SMEs) are non-subsidiary, independent companies which employ less than a given number of employees. This number varies in different countries. The most frequent upper limit designating an SME is 250 employees, as in the European Union and Turkey (Ensari and Karabay, 2014). However, some countries/regions limit the number of employees to 200, while the United States considers SMEs to include companies with fewer than 500 employees. Small and medium-sized enterprises are the main component of free economy and social stability (Arshad et al., 2020). They represent more than

95% of private sector enterprises, more than half of total employment and one third of investments in general. According to European Union 2012 data, SMEs represents 58% of the value addition created in the whole union. The importance of SMEs lies in their role in growth at all stages of economic development. SMEs not only contribute to production, achieve social goals and attract large amounts of foreign exchange reserves to a country, but are also of obvious importance in generating employment, which means that they are the backbone of the private sector around the world (Goncalves, 2018). Most of the companies are small and medium-sized companies and play an important role in the global economy. The regional units of SMEs are seen as important participants in the development of each country and region in various countries. The region studied the importance of small and medium-sized enterprises in the country's economy in tons. Some countries / regions have strengthened their support for SMEs in numerous plans and policies (Khaskheli et al., 2016). During this context, the changes were created regarding definition of SMEs in Republic of South Africa. Several programs are enforced to boost the innovation and entrepreneurship of SMEs. Therefore, support for SMEs is one in every of the South Africans Commissions priorities for economic process, job creation and economic and social cohesion (Keskin, Senturk, Sungur, & Kiris, 2010). SMEs play a vital role within the South African economy. Additionally, South is seen SMEs as a vital tool in achieving the capital of Lisbon Strategy. The importance of the SME sector is widely recognized throughout the world, thanks to its important contribution to the realisation of many socio-economic goals, such as increasing employment, production, promoting exports and fostering entrepreneurship. Recent empirical research shows that SMEs contribute more than 50% of GDP and more than 65% of total employment in high-income countries (Sukarmijan and Sapong, 2013). SME‘s and informal enterprises, account for over 60% of gross domestic product and over 70% of total employment in low-income countries, whereas they contribute over 95% of total employment and regarding 70% of gross domestic product in middle-income

countries. Within the European Community countries, for instance, the area unit some 25 million little businesses, constituting 99% of all businesses; they use nearly 95 million folks, providing 55% of total jobs within the non-public sector. Vital contribution is additionally on exports and on productivity growth. However, the particular importance of SMEs is emerged to adapt the ever-changing conditions of competition and innovation with the economic process. SMEs, in several studies, area unit seen as key actors in innovation systems and area unit vital in increasing the competitive and innovative capability of the countries or regions (Keskin et al., 2010).

2.6 Information System Success

Information structures (IS) have attracted an excessive degree of funding because of their very critical software programs which have a tremendous effect at the enterprise world (Alshardan et al., 2016). Despite the anticipated success, few researches have investigated the fulfilment of such structures to make sure that the success are realised. However, it's miles tough to degree those successes because of the shortage of consensus at the contributors (Irani, 2008). Firstly, the effect of IS is oblique and is motivated through many elements together with human, organisational and environmental elements. A combination of technical and social factors of IS complicates and confuses such measurements (Petter et al., 2008). Secondly, IS and paintings practices are so intertwined that it's miles tough to envision character influences on fulfilment (Alshardan et al., 2016). A third factor pertains to the attitude of the technique used to degree the fulfilment of IS wherein the identity of the established variable is tough (Seddon et al., 1999).

The IS fulfilment version is possibly the maximum noted version with inside the IS network (Vaske et al., 2017; McLean and Delone, 2003). The Maclean and Delone Model had been efficaciously examined in lots of empirical research (Yua et al., 2009). Defining and measuring

the fulfilment of IS stays difficult for plenty elements (Seddon et al., 1999). The first thing is a combination of technical and social factors of IS (Yua et al., 2009). Second, it argues that data era and paintings practices are actually so intertwined that it's miles tough to pinpoint every contribution to fulfilment.

Mishra and Sharma (2014) have connected the problem of defining IS fulfilment to methodological factors associated with the dimension of IS fulfilment. It is tough to assign an established variable to the dimension of IS fulfilment because of many theoretical and methodological issues. The fulfilment of IS is an ambiguous idea that is based on distinct stakeholders and distinct kinds of IT (Seddon et al., 1999). In network practice, Markus and Cornelis (2002) argue that there's an essential disparity in each the realistic and educational deliberating data structures, and absence consensus and readability approximately the results of fulfilment. DeLone and McLean (2003) reviewed the prevailing definition of IS fulfilment and its corresponding scale and categorised it into six essential categories. Therefore, they created a multidimensional dimension version with interdependencies among distinct fulfilment categories.

The updated model includes six interrelated dimensions such as information system and service quality, intent to use, user satisfaction and net benefits. DeLone and McLean demanded extra improvement and validation in their version, and plenty of researchers sought to increase or respecify the unique version. Following the assessment of many contributions to the version 10 years after the primary version changed into published, DeLone and McLean proposed an updated IS fulfilment version (DeLone and McLean, 2003). Wu and Wang (2006) specify the DeLone and McLean model for measuring the fulfilment of knowledge and management system. Five variables (system quality, knowledge or information quality, perceived merit of knowledge and management system, user satisfaction, and system use) have been used as

established variables whilst assessing the fulfilment of knowledge and management system and their interrelationships have been proposed imperial tests.

Knowledge and management system is an IS magnificence for coping with organisational information, a gadget advanced to aid and beautify organisational techniques of information generation, garage and retrieval, transmission and utility (Thomas, 2006). Success of carried out data structures and recognition of era inside organisations. This take a look at expands the scope of information on IS fulfilment subjects through persevering with those traditions and growing an extra complete model for measuring IS fulfilment and era recognition inside authorities' organisations (Mardiana). et al., 2015).

Almutairi and Subramanian (2006) used an empirical utility of the DeLone and McLean model in a non-public zone business enterprise in Kuwait. Certain direct institutions among the unique Delone and the variables of the McLean version have been supported through preliminary correlation analysis. As an end result of the analysis, it changed to showed that the pleasant of data and the pleasant of the gadget have a brilliant impact on users' satisfaction. Using the mixing of TAM (Total Acceptance Mode) and UTAUT (Unified Theory of Acceptance and Use of Technology) with inside the DeLone-McLean Model is for the motive of use as TAM has a more potent and sounder theoretical background. Appropriate stipulations have to be provided. Behavioural Intention Prediction (BI) (Mardiana et al., 2015).

Additional studies withinside the TAM and UTAUT literature essentially predicts (BI use intent) perceived usefulness (PU), expectation of results (PE), expectation of effort (EE) and social effect (SI). Only have been detected (Mardiana et al., 2015). Based on those results, PU, PE, EE and SI could be incorporated into the DeLone-McLean model as extra stipulations for meant use. Information pleasant, gadget pleasant, and provider pleasant precede the diploma

of use. The 3 variables got here from the technical facet of IS and their use (BI) got here from the concept of psychology (Mardiana et al., 2015).

2.7 Information System Success Measure in Small and medium enterprises (SMEs)

Information system success measure in SMEs show that planning information systems in SMEs becomes more critical as technology becomes more central to the SMEs products, processes and that planning needs to be integrated with business strategy (Levy and Powell, 2000). The little planning that takes place tends to focus on improving the efficiency and effectiveness of the operating system, and attention is rarely paid to competitiveness (Gamage et al., 2020). Research suggests that companies should reflect on the role of IS in measuring success and adjust the IS planning process to match. One reason for the limited view of SMEs on planning is that most SMEs make incremental investments in information systems, usually in response to specific identified needs, especially to improve basic management and transaction processing (Andarwati et al., 2020).

Once benefits appear, SMEs are more inclined to increase investment in IS. Subsequently, people learned that IS is essential to future growth and success, and that IS business strategy and IS strategy are intertwined (Chatterjee and Kar, 2020). Indeed, SMEs that plan and manage change are more likely to be successful in managing growth. They regard planning for systems ahead of the stage of growth for which they are required as particularly important (Levy and Powell, 2000). Additionally, highly competitive environments are also likely to drive SMEs to change business processes. Investment in IS increases survival rates of SMEs, supporting the contention that information system is vital to SMEs (Levy and Powell, 2000).

Therefore, information systems can add value to SMEs and SMEs need to develop strategies for their information systems. The main task for researchers and practitioners is to determine

the best way to measure SME success indicators. Although the field is under study, some jobs are related (Najib and Fahma, 2020).

This research investigates and builds upon it. It is vital that the outcome is an ISS development method that is both methodologically rigorous and crucially, operationalizable in the SME context. The research here has two mutually supporting thrusts. The first is theoretical, critiquing existing ISS models and developing new ones (Levy and Powell, 2000).

2.8 The Problem of Measuring Success of IS

The problem of measuring success of information systems is recognized by many researchers as a difficult concept to define. Caldeira and Ward (2002) discusses the concept of IS success and define a legitimate measure that can clearly differentiate the relative levels of success in the firms studied. They define the effectiveness of an information system as a common description of the success of an information system, which can be described as the degree of contribution of the information system to the achievement of organisational goals, that is, its impact on organisational performance. However, there are many controversies about the impact of information systems on organisational performance. Stakeholder expectations can vary widely and are not easy to assess accurately. An information system is an organisational resource that serves certain stakeholders but no other stakeholders. Understand IS problems and find solutions to them (Zwikael and Meredith, 2019).

Through a comprehensive literature review of IS success measures, concluded that in searching for an IS measure, rather than finding none, there are nearly as many measures as there are studies (McLean and DeLone, 2003). Many researchers suggest that the successful interaction between management and IS should be measured by user information satisfaction. User satisfaction or user information satisfaction is probably the most widely used single measure of IS success because satisfaction has a high degree of face validity (MacLean and DeLone,

2003). It seems hard to classify a system that users say they like as unsuccessful. Furthermore, some instruments have been developed to measure user information satisfaction allowing different studies to be compared although some authors have been critical of the usefulness of those instruments to measure user satisfaction, some argue that user satisfaction is not enough to adequately capture the full meaning (MacLean and DeLone, 2003). As SMEs are less complex than large organisations, the entrepreneurs and senior managers are usually involved in every organisational process (Caldeira and Ward, 2002). Therefore, they tend to have a comprehensive perspective of all organisational issues including IS. In order to compare the perceived levels of success across the cases, four levels were defined based on combining previous work by successful measure of the firm's managers agree that they are fully satisfied with the systems and the information they produce, real benefits can be identified, and significant problems do not exist (Frefer et al., 2018).

2.9 Strategic Benefits of Information System Success

It is generally agreed that SMEs contribute significantly to economic development. They are associated with discovering new markets and exploiting them to their advantage. Similarly, they are the heart of founding new ventures and a source of income and employment for millions of Africans (Broembsen et al., 2005). This means that SMEs create wealth by stimulating demand for goods, investment and trade (Yoshikuni and Albertin, 2018). Without SMEs, many African governments will experience financial and developmental constraints, all of which would only worsen the living standards of low-income persons often served by the sector (Santarelli and Vivarelli, 2007). Another important role played by SMEs is that of inventing, innovation of new ideas and technology. The businesses provide room for pre-incubating, incubating, introducing and commercializing new products (Broembsen et al., 2005). In many Countries SMEs originate and pioneer new knowledge and test it before it

disseminates to large industries or macro economies (Muriithi, 2017). Through their entrepreneurial spirits and central locus, the business founders take the risk to identify and seize opportunities and turn them into workable and market-driven products (Muriithi, 2017).

2.10 The Contingency Approach of Information System Success Measure on SMEs

Researchers have introduced the idea of various quantitative measures of IS success on SMEs such as system quality, service quality, information quality, user satisfaction, use, self-efficacy, intention to use, and organisation benefit or impact (Heo and Han, 2003). Delone and McLean created an IS success model and suggested that the various metrics from the IS success category should be systematically combined to create a comprehensive measurement tool. The model attempts to reflect interdependence. The essence of IS success is the description of the relationship between the six dimensions of IS success (Ghobakhlooa and Tanga, 2015).

They contend the following: System quality and information quality singularly and jointly affect both use and user satisfaction. Additionally, the amount of use can affect the degree of user satisfaction positively or negatively as well as the reverse being true. Use and user satisfaction are directly antecedents of individual impact, and lastly this impact on individual performance should eventually have some organisational impact (Heo and Han, 2003). Sethibe and Steyn (2016) also suggested a similar idea for the selection of IS success measure. They found that the IS function's impact on strategic direction, the integration of the IS function planning with corporate planning, the quality of information outputs, and the IS function contribution to organisational financial performance were highly ranked in terms of importance.

2.11 The DeLone-McLean Model for IS Success

The DeLone and McLean model for IS success described in Figure 2.11, assumes that system quality and information quality, individually and jointly affect user satisfaction and use. It also

posits use and user satisfaction to be reciprocally interdependent and presumes them to be direct antecedents of individual impact which should also have some organisational impact. According to McLean and DeLone (2003), model characterize system quality as desired characteristics of the information system itself and information quality as desired characteristics of the information product.

More concretely they incorporate four scales from the Bailey-Pearson instrument into system quality (convenience of access, flexibility of the system, integration of the system and response time) and nine scales into information quality (accuracy, precision, currency, timeliness, reliability, completeness, conciseness, format and relevance) (Alshardan et al., 2013). Much of the research on user information satisfaction has concerned users satisfaction with specific features of a system covering features of both system quality and information quality (Alshardan et al., 2016). User satisfaction in DeLone model and MacLean refers to the overall user satisfaction measured independently of system quality and information quality. Otherwise, the relationship between system information quality and user satisfaction would be an artifact of measurement.

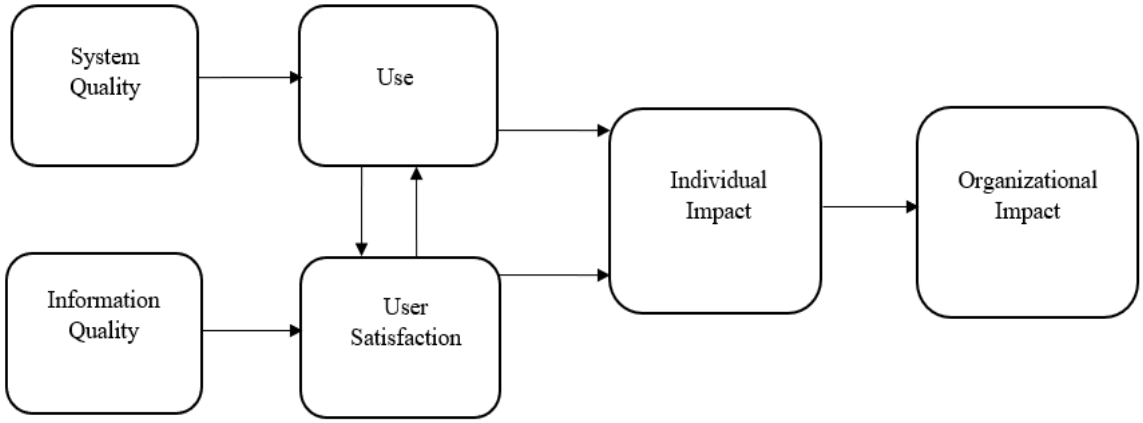

Figure 2.1: DeLone and McLean IS success model

Source: Delone and Maclean (2003).

2.12 Organising the Literature Review

The updated D&M model (2003) presented in figure 2.12 suggests that IS success can be examined at different levels therefore, this literature review investigated if there are differences in the strengths of the relationships based on whether the research focused on an individual or organisational level when measuring and evaluating the various success constructs and relationships. Each of the constructs of the D&M model has multiple operationalizations and the support or lack of support for relationships between constructs may be due to the way the constructs were measured. Therefore, this review also discusses the specific success measures that were used in the selected studies.

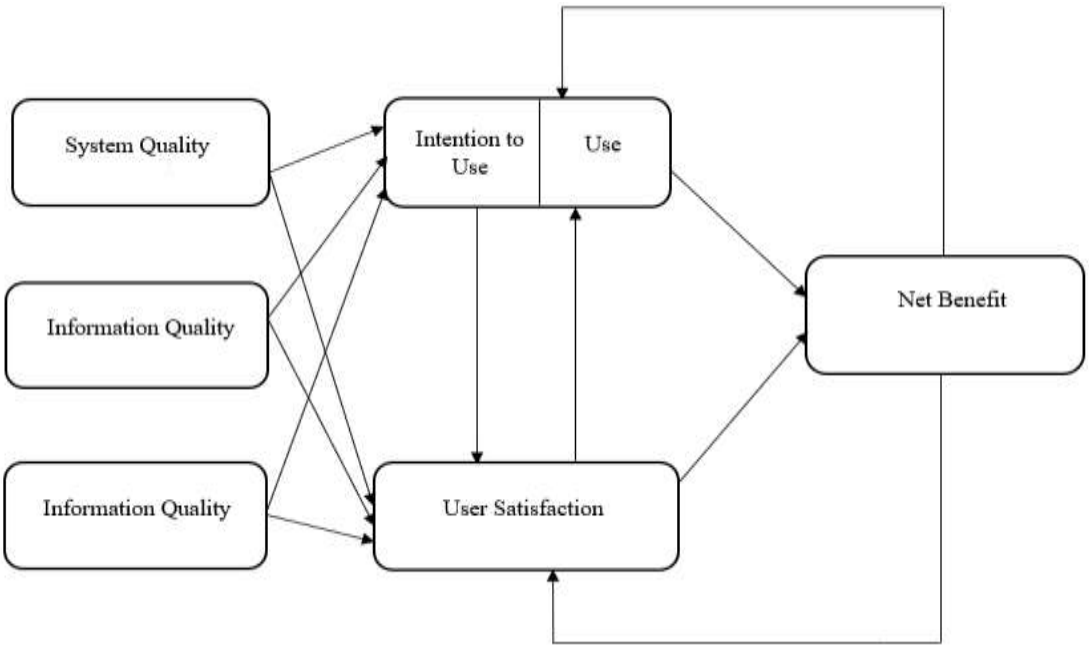

Figure 2.2: Updated D&M IS success model

Source: McLean and Delone (2003).

An alternative model that focuses on the causal variance aspects of the interrelationships among the taxonomic categories, separates the variance of IS success model from the variance model of behaviour that occurs as a result of IS success (Saadan et al., 2014). IS success model include three classes of variables: measures of information and system quality, general perceptual measures of net benefits of IS use (i.e., perceived usefulness and user satisfaction), and other measures of net benefits of IS use (Saadan et al., 2014).

Delone and McLean (2003) propose an updated IS success model see (Figure 2.2a) and evaluated its usefulness considering the dramatic changes in IS practice especially the advent and explosive growth of success measure in SMEs.

Based on prior studies, Delone and McLean (2003) propose an updated model of IS success by adding a service quality measure as a new dimension of the IS success model and by grouping all the impact measures into a single impact or benefit category called net benefit

(Wang and Liao, 2008). Although some researchers claim that service quality is merely a subset of the model's systems quality, the changes in the role of IS over the last decade argue for a separate variable called the service quality dimension (McLean and Delone, 2003). On the other hand, while researchers have suggested several IS impact measures such as individual impacts, McLean and Delone (2003) also suggest that further development, challenge, and validation of their model are needed. Thus, we assume that an updated IS success model can be adapted to the system success measurement in the success measure of IS in SMEs context (Wang and Liao, 2008).

The theoretical base of figure 2.2a is DeLone and McLean' information systems (IS) success model. This model provides a comprehensive understanding of IS success by identifying and explaining the relationships of six critical variables for IS success. These variables are system quality, information quality, IS use, user satisfaction, individual impact and organisational impact (Yu and Qian, 2018). DeLone and McLean (2003) updated their model to include an independent variable service quality. All the impact variables were grouped into a single impact variable, net benefits, a generalized term that encompasses all levels and types of impacts of IS, including individual, work group, organisational, inter-organisational, consumer and societal impacts (Yu and Qian, 2018).

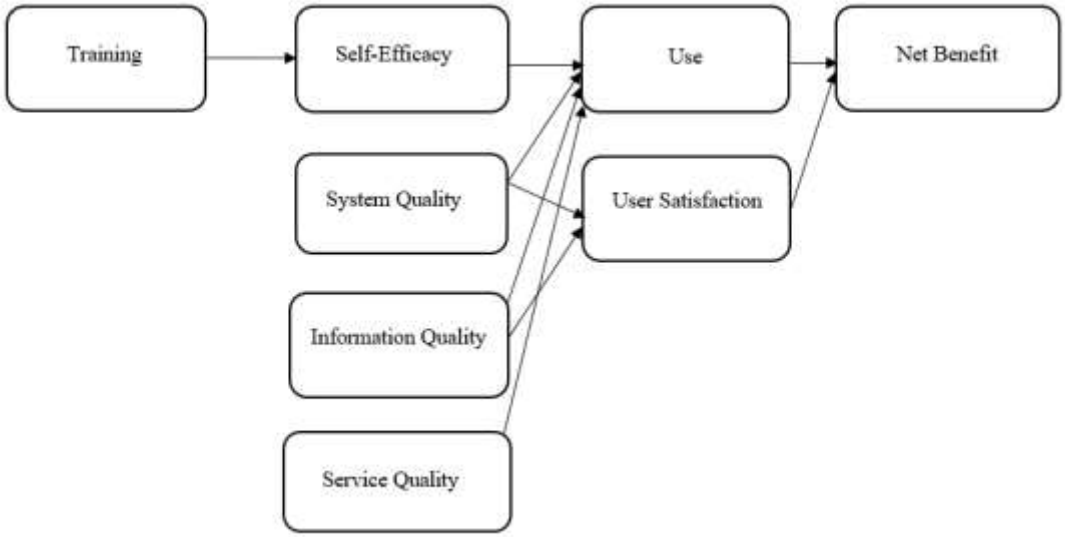

Figure 2.2a: The Hypothesized EHR Systems Success Model

Source: Yu and Qian (2018).

2.13 Conclusion to Chapter Two

The literature review revealed a lack of significant extant literature on the specifics of the topics. Indeed, when considered together the results of previous studies on the role of measuring the success of IS in SMEs are inconclusive in that they cannot be regarded as robust or complete and are often contradictory. Added to this, to date, no significant work has considered the role of measuring the success of IS in SMEs since 2003 (Hall, 2004). It is perhaps surprising that it is possible to draw a model for this research study from the literature that considers using Delone and Maclean (2003) model in measuring the success of IS in SMEs as its main focus (Hall, 2004). The following chapter discusses in detail research methodology.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

To comprehend the critical idea of the exploration and how they fit in this examination technique, the research considered to follow Honeycomb model (see Figure 3.1). In this study, four highlighted elements or key concepts of the research are joined with three other elements which makes up research methodology. Put in another way in the honeycomb model, the seven elements namely: (1) research philosophy, (2) research approach, (3) research strategy, (4) research design, (5) data collection, and (6) Data analyses techniques, come together to form research methodology. This structure is characteristic of the main headings building the methodology of this chapter. The reason for the numbered portions is to assist the reader with seeing at which stage every component falls inside the chapter. (see figure 3.1) illustrated by showing the seven outer elements combining to make up the research methodology.

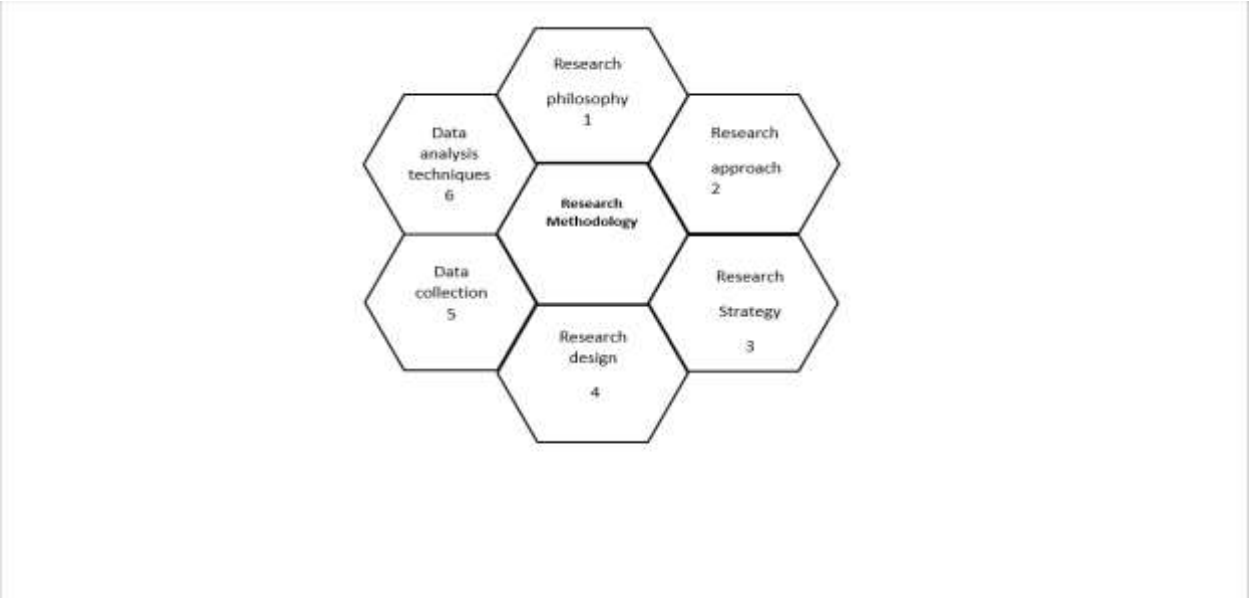

Figure 3.1 The Honeycomb of Research Methodology

Source: (Wilson, 2013)).

3.2 Research Philosophy

Research philosophy is connected to perspectives on the improvement of information. there are three reasons why a comprehension of philosophical issues is exceptionally valuable. To begin with, it can assist with explaining research designs (Wilson, 2013). This entails considering the type of evidence required and how it is to be collected and interpreted. Second, knowledge of philosophy can help the researcher to recognize which designs work best (Kornberger and Mantere, 2020). Finally, knowledge of philosophy can help the researcher identify and adapt research designs according to the constraints of different subjects or knowledge structures. In this study a positivism approach was used (Wilson, 2013). Through being detached in this way the hope is that of being truly objective. The carrying out of this research is usually based on a deductive approach, moving from theory to observation. In general positivists want the findings to have applicability to the whole of a population. Analysis of observations is likely to be quantifiable. The research is epistemologically positivist, ontologically objectivist, and axiologically value-free.

3.3 Research Approach

The research approach used in this study is the deductive approach. Deductive approach starts with and applies a notable hypothesis. A deductive approach is worried about building up a speculation dependent on existing hypothesis and afterward planning an exploration procedure to test the theory (Wilson, 2013). This type of research theory and hypotheses built on it come first and influence the rest of the research process. This type of research is often associated with the quantitative type of research. In this study a proposed model that was derived from Delone and MacLean (2003) was used (see figure 3.2).

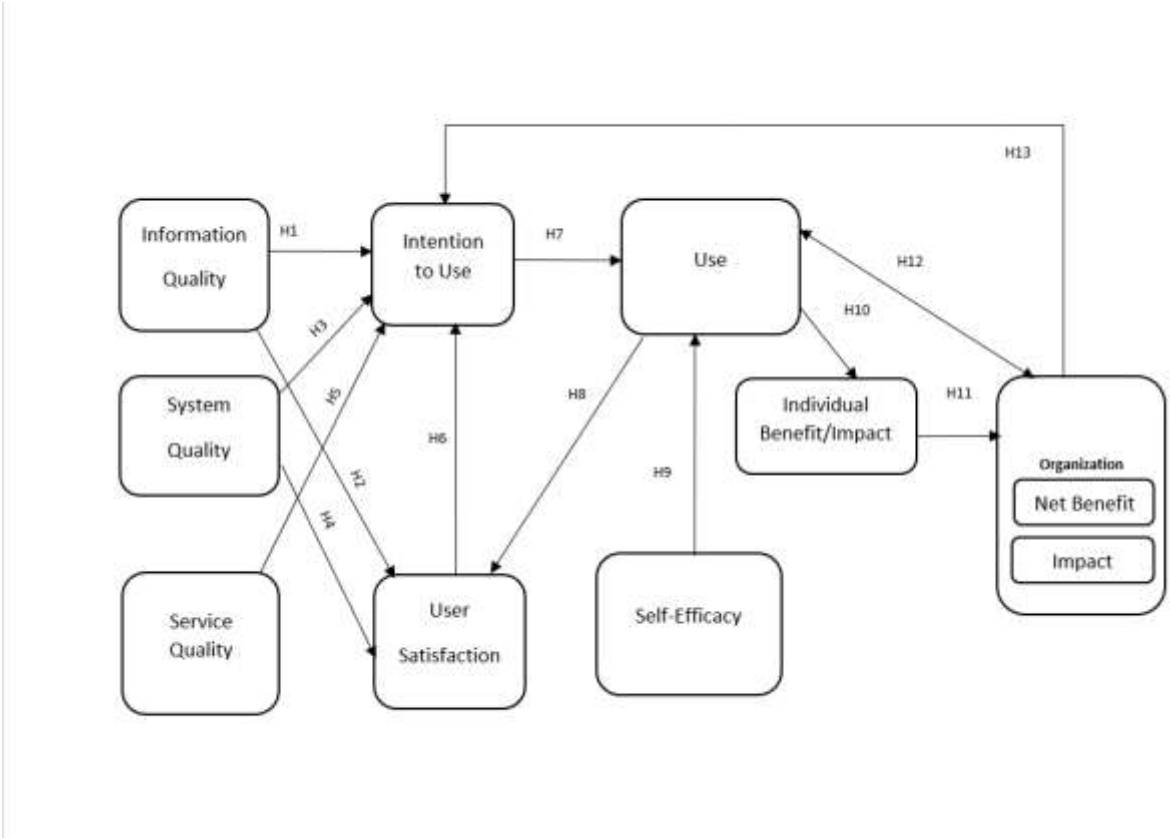

Figure 3.2 Proposed model of IS success (McLean and Delone, 2003) and (Yu and Qian, 2018).

The proposed model of IS success is presented in Figure 3.2 which is developed based on the theoretical background discussed in the existing literature. The proposed model of measuring success of an information system in SMEs is derived from (McLean and Delone, 2003) model and (Yu and Qian, 2018). In accordance with DeLone and McLean (2003) model this research proposes a comprehensive multidimensional model of measuring success of information system on SMEs (see Figure. 3.2), which suggests that system quality, information quality, service quality, intention to use, user satisfaction, use, self-efficacy, individual benefit/impact, use and perceived organisational benefits/impact, are success variables in SMEs. As mentioned earlier, system usage continues to be used as an IS success variable in several empirical studies and continues to be developed and tested by IS researchers.

3.3.1 Hypothesis

This study tested the following hypothesis:

H1. Information quality positively influence intention to use.

H2. Information quality positively influence user satisfaction.

H3. System quality positively influence intention to use.

H4. System quality positively influence user satisfaction.

H5. Service quality positively influence intention to use.

H6. User satisfaction positively influence intention to use.

H7. Intention to use positively influence the use.

H8. Use positively influence user satisfaction.

H9. Self-efficacy positively influences the Use.

H10. Use positively influence Individual benefits/impact.

H12. Use positively influence organisation benefit/impact and Organisation net benefit/impact positively influence the Use.

H11. Individual benefits/impact positively influence organisation benefit/impact.

H13. Organisation net benefit/impact positively influence intention to use.

The level of significant allowed in this study is 0.05.

3.3.2 Variables and their Operational Definitions

System quality - System quality represents the quality of the information system processing itself, which includes software and data components, and it is a measure of the extent to which the system is technically sound (Gorla et al., 2010). System quality is concerned with whether

or not there are bugs in the system, the consistency of user interface, ease of use, quality of documentation, and sometimes, quality and maintainability of program code (Gorla et al., 2010). A comprehensive instrument for system quality was developed and validated by Sedera and Gable (2004), which resulted in nine attributes – ease of use, ease of learning, user requirements, system features, system accuracy, flexibility, sophistication, integration, integration, and customization.

Information quality - Information quality refers to the quality of outputs the information system produces MacLean and Delone model (2003), which can be in the form of reports or online screens. Four dimensions of information quality are: accuracy, completeness, consistency, and currency. Accuracy is agreement with an attribute about a real-world entity, a value stored in another database, or the result of an arithmetic computation (Gorla et al., 2010). Completeness is to be defined with respect to some specific application, and it refers to whether all the data relevant to that application are present. While consistency refers to an absence of conflict between two datasets, currency refers to up-to-date information. Researchers have used a variety of attributes for information quality(Lukyanenko et al., 2020).

Service quality - Is considered as a critical determinant of competitiveness. Attention to service quality can help an organisation to differentiate itself from other organisations and through it, gain a lasting competitive advantage (Ghobadian et al., 2000). High quality of service is considered an essential determinant of the long-term profitability not only of service organisations, but also of manufacturing organisations (Nunkoo et al., 2020) . In some manufacturing industries, service quality is considered a more important order winner than product quality. Superior service quality is key to improved profitability, and not the cost of doing business. Exemplary service is the next sale in the making. Service quality affects the repurchase intentions of both existing and potential customers (Ghobadian et al., 2000).

Intention to use - MacLean and Delone (2003) contend that use and intention to use are alternatives in their model and that intention to use may be a more acceptable variable in the context of mandatory usage. However, citizens' use of G2C (Government to Citizen) systems is entirely voluntary, and system use is an actual behaviour which has been considered as the variable closer in meaning to success than behavioural intention to use. Thus, this study adopts use instead of intention to use as an eGovernment systems success measure (Wang and Liao, 2007).

Use - There has been an intense debate about whether system use is a good measure of IS success. Although some authors have suggested that it is better to remove system use as an IS success variable, DeLone and McLean argued that system use was an appropriate measure (Wu and Wang, 2006). They asserted that the source of the problem was a too simplistic definition of system use, and that researchers must consider the extent, nature, quality, and appropriateness of it. Simply measuring the amount of time a system is in use is not enough (Wu and Wang, 2006).

User Satisfaction - As was true in the original formulation of the DeLone and MacLean Model, use and user satisfaction are closely interrelated. Use must precede user satisfaction in a process sense, but positive experience with use will lead to greater user satisfaction in a causal sense. Similarly, increased user satisfaction will lead to increased intention to use, and thus use (Wu and Wang, 2006). As a result of this use and user satisfaction, certain net benefits will occur. If the IS or service is to be continued, it is assumed that the net benefits from the perspective of the owner or sponsor of the system are positive, thus influencing and reinforcing subsequent use and user satisfaction (Ameen et al., 2020).

Self-Efficacy - Self-efficacy is one of the most validated and researched theory of motivation across subject and task types and is an ideal theory to understand why people choose to share

knowledge in some contexts and not in others (Steven et al., 2007). Volunteer organisations or informal organisations outside normal firm boundaries may better facilitate fluid knowledge transfer at the individual level than within the traditional organisation structure and extrinsic organisational rewards may exert a negative effect on one's intention to share knowledge (Schenkel et al., 2019). Specifically, software developers in the open source software are presented as a prime example of voluntary and effective knowledge sharing which may be explained by the inputs and rewards that differ in the open source versus traditional organisational structure (Steven et al., 2007).

Individual use - The use of strengths is important both on an organisational and an individual level. Individuals have a natural tendency to grow and develop their potential and if they find themselves in an environment that supports their specific need for development, they will flourish (Mostert, 2015). Research has indicated that when employees' strengths are implemented, it adds to their goal attainment, and enhances their self-esteem and well-being, which results in them feeling happier and more (Mostert, 2015).

Net benefits - It is evident that IS can provide a variety of benefits for organisations. Improved quality of tasks, time parsimony, improved job performance, staff productivity, operation efficiency, improvement in decision-making and competitive advantage are examples of IS benefits for businesses (Tanga and Ghobakhlooa, 2015). For the individual level of analysis, perceived usefulness or job impact is the most common measure while at the organisational level, profitability measurements are mostly preferred. In the context of SMEs, benefits of IS are generally characterized as the effects of the IS on the organisational performance of these businesses. IS success model suggests' that net benefit is directly affected by IS use. Several prior studies provided support for a significant positive effect of IS use over net benefits at the organisational level of analysis (Tanga and Ghobakhlooa, 2015).

3.4 Research Strategy

In this study, research strategy used is quantitative. A quantitative way to deal with research draws an enormous and representative sample from the population. In this research a quantitative approach is often associated with a deductive approach (Chto et al., 2016). Population is a number of people or units from which research information will be obtained (Chto et al., 2016). The target population of this study was SMEs owners/managers/employees operating in Gauteng province, South Africa. Sampling size is defined as a technique of electing the number of observations to include in a sample (Singh and Masuku, 2014). Additionally, the sample size is an important feature of any study or investigation in which the aim is to make inferences about the population from a sample (Singh and Masuku, 2014). A sample size of employees, managers and owners of SMEs from a population of N corresponds to the final set of figures are discussed in detail in chapter four. This approach is useful for conducting research on a particular subset of a larger population (Singh and Masuku, 2014). The sample size n was calculated using the equation shown on below (Wilson, 2013):

$$n = \frac{N}{1+N(e)^2}$$

where N = population and e = precision (sampling error)

3.5 Research Design

A research design is a definite structure or plan that assists with managing the research through the exploration interaction permitting a more noteworthy probability of accomplishing exploration destinations (Wilson, 2013). Essentially research designs are detailed plans to focus and guide the research process. They can be formalized as research proposals and are influenced by both technical and contextual considerations (Goundar, 2012).

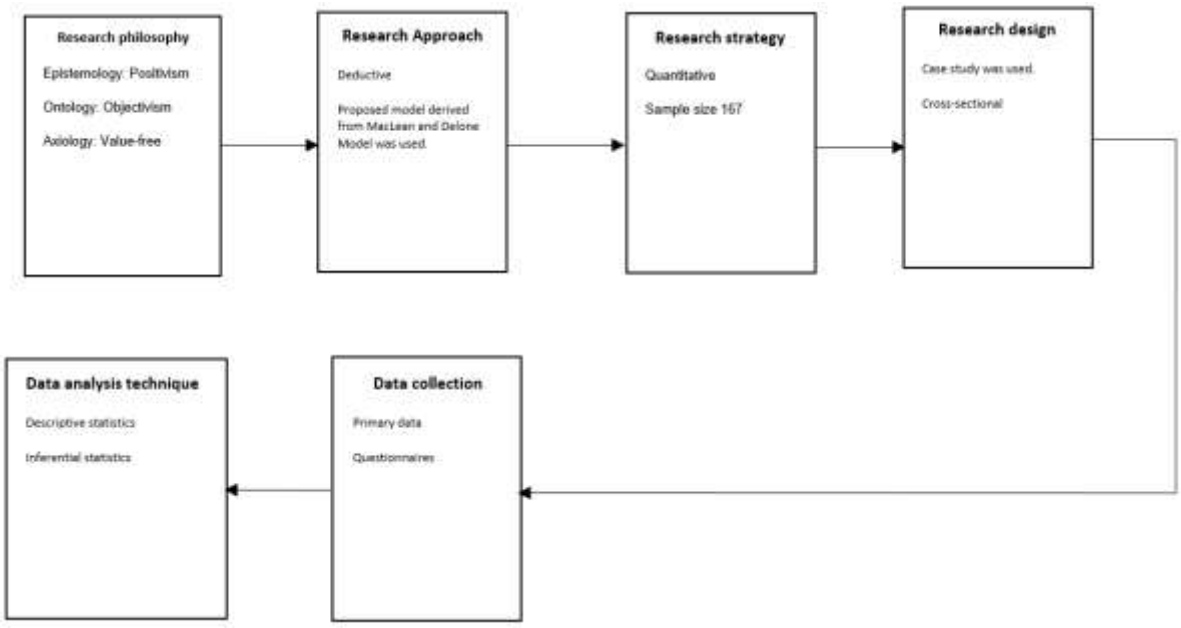

Figure 3.5 Research design

Source: Researcher Compilations.

3.6 Data Collection

Data collection is a set of questions deliberately designed to elicit responses from respondents for the purpose of collecting data or information. Data was collected using a set of an online survey questionnaire appropriate to each sample group (Marajos et al., 2016). Online survey questionnaire distributed to participants (see table 3.6). The research used a Likert-scale question perceived importance ranked from 1 to 5, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. The questionnaires were grouped into two-parts; demographic and survey questionnaires. The survey questionnaire is viewed as the best instrument for gathering a large number of responses. According to Ponto (2015) this tool gathers information about people's attitudes, facts, behaviour, activities and responses to events, and usually consists of a list of written questions. Introductory letters were sent to sampled emails of the survey followed by the link to the online survey questionnaire.

Table 3.6 Questionnaires

Section 1			
Item Description	**Item Code**	**Variable**	**Author(s)**
IQ1. Information from the system is relevant to my work. IQ2. Information I get from the system is accurate. IQ3. Information is easy to understand information from the system. IQ4. The information is presented in a useful format.	IQ	Information Quality	(Yu and Qian, 2018)
Section 2			
Item Description	**Item Code**	**Variable**	**Author(s)**
SysQ1. The system is easy to use. SysQ2. The system is useful. SysQ3. The system is easy to learn. SysQ4. I can retrieve information I need easily.	SysQ	System Quality	(Yu and Qian, 2018)
Section 3			

Item Description	Item Code	Variable	Author(s)
SerQ1. The support services for the system are dependable. SerQ2. The support services give me individual attention. SerQ3. Overall, the support services meet my needs.	SerQ	Service Quality	(Yu and Qian, 2018)
Section 4			
Item Description	**Item Code**	**Variable**	**Author(s)**
US1. Overall, I am satisfied with the system. US2. This information system is more useful than I had expected. US3. This information system assists me in performing my tasks better. US4. This information system is extremely useful. US5. Using this information system enables me to accomplish tasks more quickly.	US	User satisfaction	(Kim et al., 2016) (Yu and Qian, 2018)

US6. This information system makes it easier to do my tasks. US7. This information system improves the quality of my decision making. US8. Use of the information system enables me to make better decisions. US9. This information system assists me in making decisions more effectively. US10. Use of the information system enables me to set my priorities in decision making.			
Section 5			
Item Description	**Item Code**	**Variable**	**Author(s)**
IU1. You intend to use any IS application. IU2. You will reuse the IS applications in the future. IU3. You will use the IS applications frequently in the future. IU4. Learning to use this information system was easy for me.	IU	Intention to Use	(Kim et al., 2016) (Bahaddad, 2017)

IU5. I found it easy to get this information system to do what I want it to do. IU6. My interaction with this information system was clear and understandable. IU7. It would be easy for me to become skilful at using this information system.			(Yakubu and Dasuki, 2018) (Meriouh and HanaeRoky, 2015)
Section 6			
Item Description	**Item Code**	**Variable**	**Author(s)**
U1. How many minutes per shift do you spend on the system? U2. How many times a shift do you log on to the system? U3. How many functions in the system have you used?	U	Use	(Yu and Qian, 2018)
Section 7			
Item Description	**Item Code**	**Variable**	**Author(s)**

II1. Management relies a great deal on me to ensure proper operation or processing when I use the system. II2. Much is left to my discretion to ensure proper operation or processing when I use the system. II3. I have considerable autonomy in deciding how to carry out my work. II4. The procedures to carry out a task are spelled out very clearly. II5. If there is an error, it is very easy for my supervisor to trace when, where, and by whom it was committed through the IS system.	II	Individual impact	(Rajan and Baral, 2015)
Section 8			
Item Description	**Item Code**	**Variable**	**Author(s)**

OI1. I know where to turn to when I need any assistance with our IS success. OI2. In my company we get good technical support for our IS. OI3. We have extensive support to help with problems related to our IS. OI4. Management is aware of the benefits that can be achieved with the use of IS. OI5. Management provides most of the necessary help and resources to enable people to use IS. OI6. Management is really keen to see that people are happy with using IS.	OI	Organisational impact	(Rajan and Baral, 2015)
Section 9			
Item Description	**Item Code**	**Variable**	**Author(s)**
NB1. The product service of the IS application system is a good value for the money. NB2. The price of the product or service of the IS application system is acceptable. NB3. The time spent in the IS application system is appropriate.	NB	Net Benefit	(Bahaddad, 2017)

Section 10			
Item Description	**Item Code**	**Variable**	**Author(s)**
SE1. When I enter data into the computer, I feel confident about what I am doing. SE2. I feel comfortable to use the system.	SE	Self-efficacy	(Yu and Qian, 2018)

3.7 Data analysis techniques

In this study, the values of variables were calculated using the average of items of the variables. The formula used to calculate the average (x) is shown in equation 3.2 (Wilson, 2013):

$$\text{Mean } (x) = \frac{\Sigma xi}{N} \qquad 3.2$$

where: Σ xi = summation of values of items of a variable and N = the total number of variables

3.8 Data Reliability and Validity

Conducting reliability of study is critical in order to ensure that the data collected through the questionnaires is reliable and it can be used to draw reasonable conclusion.

3.8.1 Reliability

Reliability refers to the ability of the system to perform and maintain its functions in routine circumstances, as well as unexpected circumstances (Amankwaa, 2016). Trustworthiness has been divided into credibility, which corresponds with the positivist concept of internal validity, dependability, which relates more to reliability; transferability, which is a form of external

validity; and conformability, which is largely an issue of presentation (Amankwaa, 2016). The reliability of the questionnaires was tested using IBM SPSS version 26 Cronbach's Alpha (α), also known as alpha coefficient. Cronbach's Alpha was developed by Cronbach (1951) with the purpose of providing a measure of the internal consistency of a test or scale, it is expressed as a number between 0 and 1 (Tavakol and Dennick, 2011). Reliability is assessed through standard correlation measures, for example Cronbach's alpha coefficient of reliability. Using Cronbach's alpha as a measure of reliability or internal consistency, high scores are indications that the tools are reliable. The piloting sample was drawn from SMEs in South Africa. From the pilot data, all items had a Cronbach's alpha of more than 0.85. All the constructs exhibit a Cronbach's alpha above 0.70 acceptance level indicates that the results of the questionnaire was a reliable measuring instrument. Improper use of alpha can lead to situations in which either a test or scale is wrongly discarded, or the test is criticised for not generating trustworthy results. To avoid this situation an understanding of the associated concepts of internal consistency, homogeneity or unidimensionality can help to improve the use of alpha (Tavakol and Dennick, 2011). Internal consistence is worried about the interrelatedness of an example of test things, though homogeneity alludes to unidimensionality. A measure is said to be unidimensional if its items measure a single latent trait or construct (Tavakol and Dennick, 2011).

3.8.2 Validity

Validity refers to the strength of the inferences or propositions and conclusions of the study. It may also imply the best available approximation to the truth or falsity of a given inference, proposition or conclusion (Twycross and Heale, 2015). It looks at whether the instrument of measure, the model to determine the constructs used in the study is appropriate and meaningful.

Both content and variable validity were checked. The following were put into consideration to ensure content and construct validity.

Content validity - to ensure content validity, the measuring instrument was designed using items that had been used by previous researchers but parameterised to fit the context of the study (Twycross and Heale, 2015).

Construct validity- to ensure variable validity, the questionnaire was developed basing on the variables of the model. The constructs were used as the categories or sections of the questionnaire while the factors for each construct were used to formulate the questionnaire items. Data reliability was determined using Cronbach's Alpha. The empirical method was employed utilising the TTF (task technology fit) theoretical framework, with the latter technique based on a factor analysis technique (Twycross and Heale, 2015). Specifically, two principal component analysis models were constructed to empirically identify the latent (unobserved) components of measuring success of IS in SMEs for the study. This was done along the variables of Maclean and Delone model. Our empirical multiple-pronged empirical approaches is justifiable on two grounds: first, the factor analysis allows us to identify common unobserved factors, measuring the success of IS in SMEs, and secondly, the factor analysis validates the anecdotal evidence of the quantitative survey, in order to draw a conclusive inference on the strength and weakness of these implementations (Twycross and Heale, 2015). We obviate spurious inferences, reduce error variance and subjectivity of the respondent's feedback, random questions measuring the same construct were included in the administered survey questions, while the Spearman rho correlation analysis, Kaiser-Meyer-Olkin (KMO) and Cronbach Alpha tests was used to validate the internal consistency and sampling adequacy of the 47-item questionnaire designed based on a Likert scale approach. In what follows, the nature of the linear association between the design survey questions to determine the

effectiveness of measuring success in SMEs based on Delone and Maclean model (2003) is established using the Spearman rho ranked correlation analysis.

3.8.3 Factor Analysis

Factor analysis was applied to test the reliability and validity of the proposed model. Firstly, with regard to the reliability, the Cronbach's α test was used to evaluate the internal consistency reliability which reflects correlations between questionnaire items belonging to one dimension (Sarmento and Costa, 2019). This result determines whether the proposed questionnaire is capable of measuring the identified factors with a stable performance. Some professionals, as a rule of thumb, require reliability of 0.70 or higher as a desirable level, while 0.60 was generally accepted as the lowest acceptable threshold (Sarmento and Costa, 2019).

3.9 Correlation

A correlation coefficient is utilised for bivariate investigation. It gauges the degree to which two factors are directly related. Estimation is addressed somewhere in the range of −1 and 1. An estimation of 1 addresses an ideal positive connection, an ideal negative direct relationship is addressed by a worth −1, and a relationship coefficient of 0 implies that there is no connection between the two factors (Wilson, 2013). All in all, the two factors are totally free. Actually, it is impossible that you will create discoveries that are entirely related or totally free. Regularly, values as a rule fall somewhere close to ±1 and 0. A direct method to see whether there is a connection between two factors is to plot the information. Pearson's item second relationship (r) is a parametric procedure that quantifies the strength of relationship between two factors or bivariate information (Wilson, 2013). The information utilised should be of a stretch or proportion type and be ordinarily circulated. On the off chance that your answer creates a solid connection between your x and y factors, this doesn't imply that x causes y. We can proceed to test this chance via doing relapse investigation talked about underneath. The

formula used to calculate Pearson's correlation coefficient (r) is shown in the equation below (Wilson, 2013):

$$r = \frac{\Sigma xy - \frac{\Sigma x \Sigma y}{n}}{\sqrt{\left(\Sigma x^2 - \frac{(\Sigma x^2)}{n}\right)\left(\Sigma y^2 - \frac{(\Sigma y^2)}{n}\right)}}$$

Where: n = the number of data pairs, y = the dependent variable, x = the independent variable, √ = square root and Σ = the sum of

3.10 Regression

Regression was calculated using the equation given on below. Regression analysis is a factual method for researching the strength of a connection between factors. Normally, the scientist intends to build up the causal impact of one variable on another (Wilson, 2013). Simple regression was used to determines the strength of the relationship between a dependent variable and one independent variable. The value of variable (y) is dependent and the value of variable (x) is independent and are linearly related. The formula used to calculate regression coefficient y is presented in the equation below (Wilson, 2013):

$$y = a + bx$$

where: x = independent variable, y = dependent variable,

$a = \frac{(\Sigma y)(\Sigma x^2) - (\Sigma x)(\Sigma xy)}{n(\Sigma x^2) - (\Sigma x)^2}$ point where the line intersects the y-axis and

$b = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{n(\Sigma x^2) - (\Sigma x)^2}$ gradient of the line.

3.11 Conclusion to Chapter Three

This study followed a honeycomb model. Research philosophy, research approach, research strategy, research design, data collection, and data analyses techniques were discussed. These

are the key methods that helped the study to identify the appropriate methodology applied in the research study. The next chapter focuses on the survey outcomes including data processing and analysis.

CHAPTER FOUR: DATA PROCESSING AND ANALYSIS

4.1 Introduction

Chapter four represents analysis of the results and findings consolidated based on the survey questionnaires in relation to the research questions that were presented in chapter three. To do the data analysis, the IBM SPSS version 26 utilised. The survey structure was in two sections. Firstly, the initial portion, section A, included the demographic information that entails respondents' gender and age. Section B was used for research purposes and to ensure that the research question was answered, and the objectives met.

4.2 Response Rate

The response rate is the number of participants who actually completed survey out of all the invited survey takers (Privitera, 2013). In this study, a response rate was calculated on the basis of the primary data collection instrument i.e., the number of questionnaires distributed. Out of one hundred and sixty-seven questionnaires distributed, one hundred and thirty-six were returned, the number of usable returned questionnaires was one hundred and twenty-six, and the number of unusable questionnaires was ten. The returned questionnaires represents a response rate of 75%. The questionnaires were duly filled and analysed in table 4.1. The response rates were considered admissible given the recommendations by (Mugenda and Mugenda, 2012) that a response rate of 50% is adequate for analysis and reporting, a rate of 60% is generally good while a response rate of above 70% is excellent. This is also the same position taken by (Kothari, 2011) who adds that a response rate of above 70% is deemed to be very good. Additionally, one hundred and twenty-six out of one hundred and sixty-seven respondents targeted for key informant online surveys fully participated, this represented a response rate of 75%. If the response rate is below 30 percent of the expected response then the validity methods used, and results will be questionable (Manfreda et al., 2016). In this research

study the percentage of 75% was above the proposed threshold. The sample size of one hundred and sixty-seven participants made it manageable with regards to time and resource constraints and it also provided critical analysis of the contents under study. Based on these assertions, this implies that the response rate for this study was adequate and increases confidence for generalization. The overall response totalled hundred questionnaires out of one hundred and twenty-six representing a 75% response rate. Ten of the responses were unusable. This left a valid sample size of one hundred and twenty-six usable responses used for analysis.

Table 4.1: Number of questionnaires sent out and returned

Sample size	Returned Questionnaires	Usable Responses	% of Usable Responses
167	136	126	75%

4.3 Demographic Summary on Responses

In this section, the researcher focused on the biographical details of the respondents. These included gender, age group of respondents in the SMEs sector. The table 4.2 represent the demographic results.

4.3.1 Gender

The study sample was heterogeneous as it was made up of both males and females. Out of the one hundred and twenty-six completed and usable questionnaire results, 31% were females, and 95% were male, probably the results showing that the SMEs sector and in particular are dominated by males.

Table 4.2 Demographic results – Gender

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	31	24.6	24.6	24.6
	Male	95	75.4	75.4	100
	Total	126	100	100	

4.3.2 Age of Research Participants

Table 4.3 demonstrated that 19% of the participants were below the age of twenty-five. Those that indicate that they are between the age of twenty-five and thirty-four made up 39% of the respondents. Participants between the age of thirty-five and forty-four were 50%, 17% of the participants were between the age of forty-five and fifty-four, while 1% of the participants were between the age of fifty-five and sixty-four. The statistics demonstrated that majority of younger people are measuring the success of IS in SMEs which is the expectations that young people, who are more accustomed to SMEs would be on the forefront. The statistics again demonstrated that the major influencer within the current research study was the age group between twenty-five and thirty-four upwards.

Table 4.3: Age group of research participants

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 25 years	19	15.07	15.07	15.07

	25 – 34 years	39	30.95	30.95	46.02
	35 – 44 years	50	39.68	39.68	85,7
	45 – 54 years	17	13.49	13.49	99.19
	55 – 64 years	1	0.79	0.79	100
	Total	126	100	100	

4.4 Eigen Value and Scree Plot

In table 4.4, eigenvalues and eigenvectors of the correlation matrix were calculated. The number of principal components that have practical significance are determined using eigenvalues (De Silva, 2017). The eigenvectors are constructed from linear combinations of original attributes in the data set. A loading plot where selected eigenvalues (PCs) and corresponding eigenvectors are plotted, is used to visualize the variation of original attributes on the selected PCs and a score plot where selected PCs and samples that were transformed into these PCs were plotted to identify possible grouping and outliers in the sample set (De Silva, 2017).

The coefficients of each original attribute give the index of agreement or disagreement in the original attributes towards the new dimension (principal component) (Wong, 2017). The sum of the squares of the factor loadings in each column is called an Eigenvalue. In other words, the Eigenvalue represent the amount of variance in the original variables that is associated with that factor (Dehkordi, 2008). As it has been shown in table 4.4, there are nine eigenvalue factors greater than 1.00. This makes the results that in the principal factor analysis of nine factors extracted from indicators (Dehkordi, 2008). The factors that are extracted from the random data are then compared to the factors extracted from the collected data (Dehkordi, 2008).

Only factors with eigenvalues higher than the random data are retained in the exploratory factor analysis (Manning, 2015). The parallel analysis is a better method than the default offered in IBM SPSS version 26, which assigns an arbitrary eigenvalue cut off of $\lambda = 1$, and has been demonstrated to be a less accurate method to use alone to determine how many factors to extract from the data (Manning, 2015). The study also examined the items contained in each factor to determine whether all items within that factor were related to the dimension measured by that factor. The research study determined if there were items that should be removed from the measure by examining the factor loadings for each item. Generally, items with a factor loading of .40 can be considered large enough to be used in the factor (Manning, 2015).

Table 4.4 Eigenvalue Factor Values

Eigenvalues (final data of project)

Extraction: Principal axis factoring

	Eigenvalue	% Total	Cumulative	Cumulative %
1	62.702	29.470	62.702	62.330
2	5.698	2.678	68.400	67.001
3	4.674	2.197	73.074	70.999
4	4.007	1.883	77.081	74.880
5	3.353	1.576	80.434	78.405
6	2.954	1.388	83.388	81.435
7	2.669	1.255	86.057	84.372
8	1.789	0.841	87.847	87.158
9	1.630	0.766	89.476	89.476

Figure 4.4 indicate that the scree is the geological term referring to the debris that collects on the lower part of a rocky slope and the scree test involves finding the place where the smooth decrease of eigenvalues appears to level off to the right of the plot. To the right of this point presumably you find only factorial scree. Thus, no more than the number of factors to the left of this point should be retained (Manning, 2015). The scree plot proposed is for determining the number of singular values that are useful and informative and that should be retained for subsequent analyses (Al-Mughamis et al., 2020). Usually, the number of informative dimensions to retain for subsequent analysis is determined by locating the elbow in this plot to the right of which one presumably finds on the factorial scree due to random noise (Manning, 2015). The hidden factors are the independent variables which cannot be directly observed. They can be divided as construct and errors. The aim of factor analysis is to reveal any latent variables by means of the manifest variable (Manning, 2015).

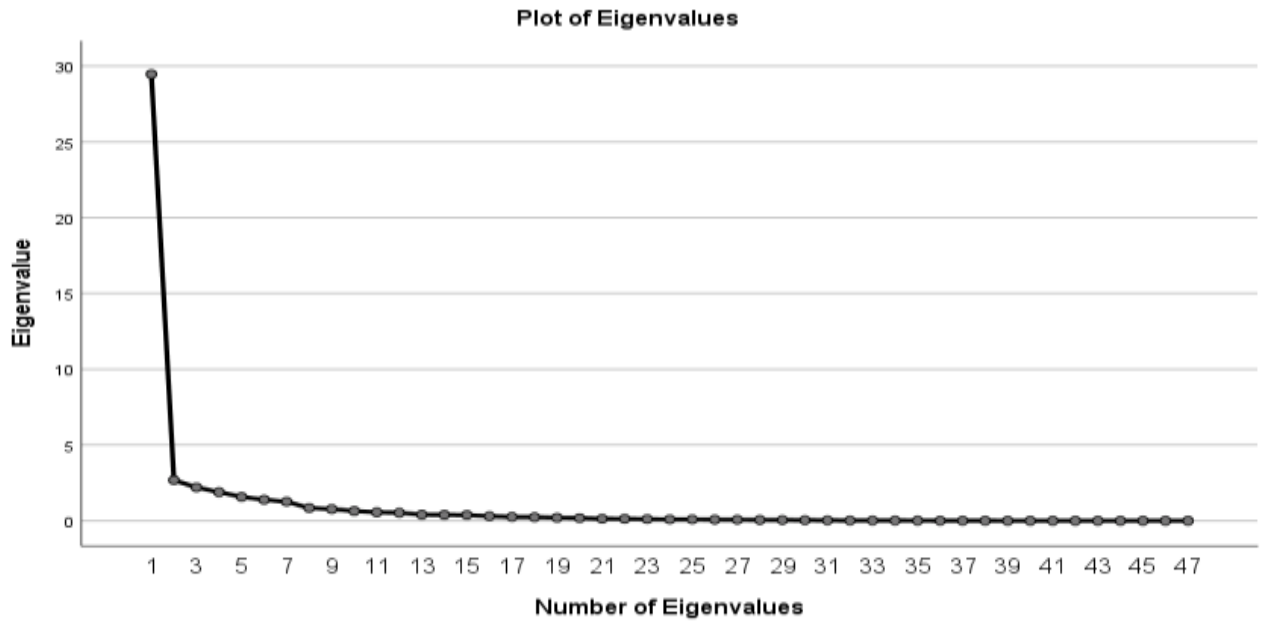

Figure 4.4 Scree Plot

4.5 Measurement Instrument of Validation and Reliability

4.5.1 Measurement Validity

The construct validity of the estimation incorporates both convergent validity and discriminant validity (Wong, 2017). Factor analysis is performed to explore whether the things are truly estimating the builds. As referenced beforehand, the factor stacking shows the level of assembly with a worthy level equivalent to or above 0.5. while AVE is a synopsis pointer for the combination, which need least estimation of 0.5 to set up focalized legitimacy (Wong, 2017). Table 4.5 summarizes the constructs, construct items, factor loadings and AVE value after the test. After the adjustment, all factor loading, and AVE values obtained are above the minimum level of 0.5 as illustrated. Therefore, the convergent validity in this study gets established. On the other hand, discriminant validity is tested by examining the square root of AVE and correlations between different constructs. When square root of AVE is greater than the correlations, discriminant validity is proven (Wyma, 2010).

Table 4.5 Convergent Validity Result and Constructive Descriptive

Construct	Items	Factor Loading	AVE
Information Quality	IQ1	0.636	0.791
Information Quality	IQ2	0.822	
Information Quality	IQ3	0.858	
Information Quality	IQ4	0.847	
System Quality	SysQ1	0.771	0.813
System Quality	SysQ2	0.799	
System Quality	SysQ3	0.802	
System Quality	SysQ3	0.88	
User Satisfaction	US1	0.818	0.833
User Satisfaction	US2	0.871	
User Satisfaction	US3	0.851	

User Satisfaction	US4	0.779	
User Satisfaction	US5	0.868	
User Satisfaction	US6	0.864	
User Satisfaction	US7	0.891	
User Satisfaction	US8	0.844	
User Satisfaction	US9	0.815	
User Satisfaction	US10	0.732	
Service Quality	SerQ1	0.859	0.876
Service Quality	SerQ2	0.891	
Service Quality	SerQ3	0.878	
Intention to Use	ITU1	0.769	0.802
Intention to Use	ITU2	0.779	
Intention to Use	ITU3	0.712	
Intention to Use	ITU4	0.797	
Intention to Use	ITU5	0.889	
Intention to Use	ITU6	0.87	
Intention to Use	ITU7	0.795	
Use	U1	0.544	0.681
Use	U2	0.675	
Use	U3	0.823	
Individual benefit/Impact	IBI1	0.735	0.774
Individual benefit/Impact	IBI2	0.72	
Individual benefit/Impact	IBI3	0.873	
Individual benefit/Impact	IBI4	0.778	
Individual benefit/Impact	IBI5	0.7	
Organisational net befit/Impact	OBI1	0.839	0.756
Organisational net befit/Impact	OBI2	0.763	
Organisational net befit/Impact	OBI3	0.818	
Organisational net befit/Impact	OBI4	0.732	
Organisational net befit/Impact	OBI5	0.756	
Organisational net befit/Impact	OBI6	0.709	

Self-Efficacy	SE1	0.796	0.806
Self-Efficacy	SE2	0.815	

4.5.2 Measurement Reliability

Cronbach's Alpha is utilised to assess the inward unwavering quality of the scales. The dependability test is completed for each build individually dependent on the gathered information. A Cronbach's Alpha worth which is more prominent or equivalent to 0.6 is for the most part worthy for exhibiting inward unwavering quality (Wyma, 2010). The higher the value, the more accurate the variable estimations are. Table 4.5a summarizes the constructs, its number of items and Cronbach's Alpha value after the test. The Cronbach's Alpha value for all constructs exceed the minimum value of 0.6. The construct Intention to Use (IU) (0.978) featured the largest value for Cronbach Alpha, then Use (U) (0.957), Organisational benefit/impact (OBI) (0.934), User Satisfaction (US) (0.930), System Quality (SysQ) (0.913), Information Quality (IQ) (0.906) Service quality (SerQ) (0.830), Individual benefit/Impact (IBI) (0.864), and lastly Self-Efficacy (SE) (0.909). Therefore, it can be concluded that the internal reliability is supported.

Table 4.5a Reliability Construct a

Construct	Cronbach's Alpha	Number of items
Information Quality	0.906	4
System Quality	0.913	4
Service quality	0.83	3
User Satisfaction	0.93	3
Intention to Use	0.978	10
Use	0.957	7

Individual benefit/Impact	0.864	3
Organisational benefit/Impact	0.934	5
Self-Efficacy	0.909	2

4.6 Correlation

Then again, discriminant validity is tried by inspecting the square root of AVE and relationships between various constructs. At the point when square root of AVE is more noteworthy than the relationships, discriminant legitimacy is demonstrated (Wyma, 2010). The correlation coefficient is a numerical expression of the frequency of a relationship between two variables. The correlation coefficient may have a value of -1.0 or 1.0. The correlation coefficient is precisely one in a perfect positive correlation (Brotherton, 2008). As such, to identify multi-collinearity between factors, it very well may be done with Pearson's relationship strategy. A Pearson's correlation coefficient above 0.8 is seen as corresponded (Chawla, 2015). Since all the constructs should be autonomously developed, the Pearson's correlation coefficient ought to be lower than the estimation of 0.8. Table 4.6 displays the correlation matrix with Pearson correlation coefficients of constructs and correlation is significant at the 0.01 level (2-tailed)(Chawla, 2015). In this study, all the square roots of AVE exceed the correlation coefficients. Also, according to the Pearson’s correlation, all correlation coefficient values are within the value of -0.8 and 0.8. These indicate that the constructs are not highly related to each other, so these constructs measure differently (Chawla, 2015). Hence, the discriminant validity is proven, i.e., there is no multi-collinearity.

Table 4.6 The construct of correlation measure

Information Quality	Intention to Use

Information Quality	Pearson Correlation	1	.743**
	Sig. (2-tailed)		0
	N	77	60

		System Quality	Intention to Use
System Quality	Pearson Correlation	1	.850**
	Sig. (2-tailed)		0
	N	71	57

		Service Quality	Intention to Use
Service Quality	Pearson Correlation	1	.826**
	Sig. (2-tailed)		0
	N	76	60

		User Satisfaction	Intention to Use
User Satisfaction	Pearson Correlation	1	.885**
	Sig. (2-tailed)		0
	N	70	57

		Intention to Use	Use
Intention to Use	Pearson Correlation	1	.535**
	Sig. (2-tailed)		0
	N	61	60

		Use	User Satisfaction
Use	Pearson Correlation	1	.622**

	Sig. (2-tailed)		0
		Use	Individual benefit/impact
Use	Pearson Correlation	1	.615**
	Sig. (2-tailed)		0
	N	74	70
		Self-Efficacy	Use
Self-Efficacy	Pearson Correlation	1	.597**
	Sig. (2-tailed)		0
	N	79	74

		Organisational benefit/Impact	Intention to use
Organisational benefit/ Impact	Pearson Correlation	1	.647**
	Sig. (2-tailed)		0
	N	72	65

		Use	Organisation benefit/impact
Use	Pearson Correlation	1	.560**
	Sig. (2-tailed)		0
	N	74	65

		Information Quality	User Satisfaction
Information Quality	Pearson Correlation	1	.874**
	Sig. (2-tailed)		0
	N	77	69

		System Quality	User Satisfaction
System Quality	Pearson Correlation	1	.902**

	Sig. (2-tailed)		0
	N	71	65
		Individual benefit/impact	Organisation benefit/impact
Individual Benefit/Impact	Pearson Correlation	1	.742**
	Sig. (2-tailed)		0
	N	72	64
**. Correlation is significant at the 0.01 level (2-tailed).			

4.7 Confirmed Correlation Construct Model

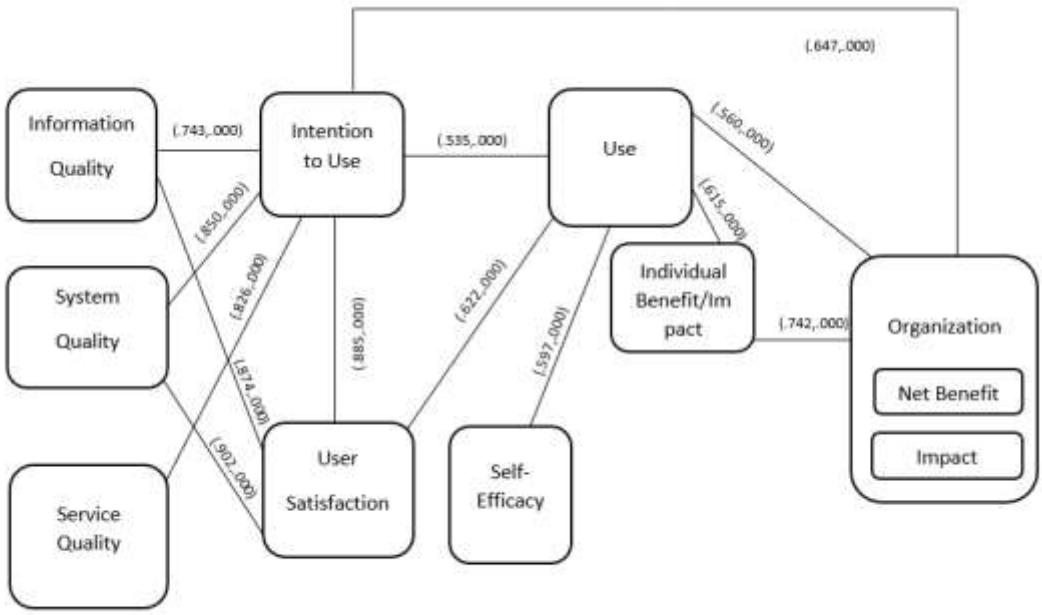

Figure 4.7 Correlation construct Model (McLean and Delone, 2003) model and (Yu and Qian, 2018).

The above figure 4.7, indicate information quality, system quality, service quality, user satisfaction, organisational benefit/impact variables has the most favourable direct impact to intention to use. Intention to use, self-efficacy, organisational benefit/impact variables has the positive impact to use. The 'Use' variable has positive impact to individual benefit/impact and individual benefit/impact variables has positive direct impact on organisational net benefit/impact.

4.8 Regression Analysis

To test the hypothesis in this study, regression analysis was used. The regression analysis is hurried to test the connection between the ten constructs. The nine constructs including information quality, system quality, service quality, user satisfaction, organisation benefit / impact, use, intention to use, self-efficacy, individual benefit/impact are the independent variables while intention to use, user satisfaction, use, individual benefit/Impact, organisation benefit/impact are the dependent variables.

Table 4.8 displays the overall model summary, including the relevant R values, R square (R^2), adjusted R square, Std. Error of the estimate, and F-test results. R^2 is a multiple coefficient of determination which indicates the degree of goodness-of-fit of the regression model and adjusted R^2 value determines also the model fitness with adjustment depends on the number of variables in the model (Mendenhall and Boudreau, 2012). In this study, the result from the model summary shows that adjusted R^2 = 0.611, meaning 61.1% of the sample variation in measuring the success of IS in SMEs is explained by the model. This indicates the model has a relatively good enough goodness-of-fit and predictive power (Mendenhall and Boudreau, 2012). 'F' statistic test is used to evaluate the utility of the regression model (Mendenhall & Boudreau 2012). In the F-test result, it shows p = 0.000 which is lower than the significant level at $p<0.05$. This implies that the overall regression model is statistically useful for

predicting the measuring success of IS in SMEs, i.e. at least one of the variables in the model are useful (Mendenhall and Boudreau, 2012).

Table 4.8 Regression Model Summery

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
Regression	0.771	0.617	0.611	1.15	65.76	0.000

*p<0.05; **p<0.01; p<0.001

Then in the table 4.9, T statistic are used to assess the nine constructs (information quality, system quality, service quality, user satisfaction, organisation benefit / impact, use, intention to use, self-efficacy, individual benefit/impact) separately to determine whether they are contributing to the predictive relationship and substitution of values to formulate a new equation (Sub 2 into 1, Sub 1 into 3, Sub 3 into 4, Sub 4 into 5) was calculated. In other words, it helps to test the ten hypotheses in our study. In Table 4.9, it represents the hypothesis test results of construct based on t-test, including data of Beta (B) coefficients, values for standard deviation of the sampling distribution and t-test results. According to Mendenhall and Boudreau (2012), Beta coefficients indicates the relationship between the independent variable and the dependent variable, i.e., to what extend the dependent variable is explained by the independent variable. A higher value of beta implies a stronger relationship. When a beta value is > 0, it indicates a positive relationship, vice versa (i.e., <0, negative relationship).

Table 4.9 Regression measure

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Information Quality	0.25	.168	.263	8.464	.000, supported
System Quality	0.34	.196	.467	2.410	.000, supported
Service Quality	0.31	.138	.826	5.589	.000, supported
User Satisfaction	0.28	.170	.691	4.100	.000, supported
Organisation Benefit / Impact	0.31	168	.791	9.312	.000, supported

a. Dependent Variable: Intention to Use

$$IU = 0.263(IQ) + 0.467(SysQ) + 0.826(SerQ) + 0.691(US) + 0.791(OBI) \quad (1)$$

Information Quality	0.23	.126	.251	1.879	.000, supported
System Quality	0.32	.132	.592	4.400	.000, supported
Use	0.21	.188	.126	1.847	.000, supported

b. Dependent Variable: User Satisfaction

$$US = .251(IQ)+.592(SerQ)+.126(U) \quad (2)$$

Intention to Use	0.24	.125	.535	4.822	.000, supported
Self-Efficacy	0.26	.102	.597	6.315	.000, supported

Organisation Benefit/Impact	0.26	.124	.560	5.363	.000, supported

c. Dependent Variable: Use

U= 0.535(IU) + 0.593(SE) + 0.560(OBI) (3)

Use	0.22	.088	.615	6.440	.000, supported

d. Dependent Variable: Individual Benefit/Impact

IBI = 0.615(U) (4)

Individual Benefit/Impact	0.28	.080	.742	8.708	.000, supported
Use	0.26	.124	.560	5.363	.000, supported

e. Dependent Variable: Organisation Benefit/Impact

OBI = 0.742(IBI) + 0.560 (U) (5)

4.9 Hypothesis of the Study

The hypothesis test results in this research that are supported or accepted are listed below and represented in figure 4.3.

Figure 4.9: Hypothesis test results

H1. Information quality influence positively intention to use.

H2. Information quality influence positively user satisfaction.

H3. System quality influence positively intention to use.

H4. System quality influence positively user satisfaction.

H5. Service quality influence positively intention to use.

H6. User satisfaction influence positively intention to use.

H7. Intention to use influence positively the use.

H8. Use influence positively user satisfaction.

H9. Self-efficacy influences positively the Use.

H10. Use influence positively Individual benefits/impact.

H11. Individual benefits/impact influence positively organisation benefit/impact.

H12. Use influence positively organisation benefit/impact and Organisation net benefit/impact influence positively the Use.

H13. Organisation net benefit/impact influence positively intention to use.

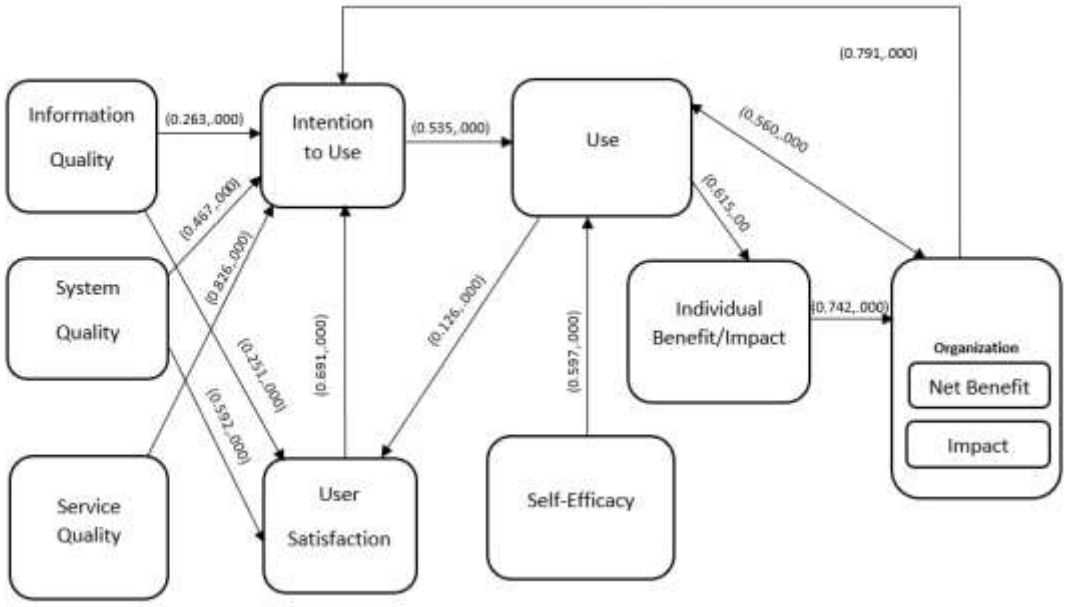

Figure 4.9a Confirmed model for regression

4.10 Formal Representation of the Confirmed Regression Model

The objective of this study was to measure the success of IS in SMEs. The variables that influenced the success of IS in SMEs are organisation benefit /impact. To measure the value of organisational benefit /impact from the variables, the research used a system of equations derived from regression analysis:

$$IU = 0.263(IQ) + 0.467(SysQ) + 0.826(SerQ) + 0.691(US) + 0.791(OBI) \quad (1)$$

$$US = .251(IQ)+.592(SerQ)+.126(U) \quad (2)$$

$$U= 0.535(IU) + 0.593(SE) + 0.560(OBI) \quad (3)$$

$$IBI = 0.615(U) \quad (4)$$

$$OBI = 0.742(IBI) + 0.560\ (U) \quad (5)$$

The measurement of success of IS in SMEs we calculate the value of the variable organisational benefit/impact. Its value is attributed to the success of IS in SMEs. The substitution is done in the following manner:

1. Sub 2 into 1,
2. Sub 1 into 3,
3. Sub 3 into 4,
4. Sub 4 into 5 as shown below.

Substitute 2 into 1

Intention to Use (IU) = 0.263(IQ) + 0.467(SysQ) + 0.826(SerQ) + 0.691(US) + 0.791(OBI)

IU = 0.263(IQ) + 0.467(SysQ) + 0.826(SerQ) + 0.691(US) + 0.791(OBI)

IU = 0.263(IQ) + 0.467(SysQ) + 0.826(SerQ) + 0.691*(0.251(IQ) + 0.592(SysQ) + 0.126(U)) + 0.791(OBI)

IU = 0.263(IQ) + 0.467(SysQ) + 0.826(SerQ) + 0.173(IQ) + 0.409(SysQ)+ 0.087(U) + 0.791(OBI)

IU = 0.463(IQ) + 0.876(SysQ) + 0.826(SerQ) + 0.087(U) + 0.791(OBI)

Substitute 1 into 3

Use(U) = 0.535(IU) + 0.593(SE) + 0.560(OBI)

U = 0.535*(0.463(IQ) + 0.876(SysQ) + 0.826(SerQ) + 0.087(U) + 0.791(OBI)) + 0.593(SE) + 0.560(OBI)

U = 0.247(IQ) + 0.468(SysQ) + 0.441(SerQ) + 0.046(U) + 0.423(OBI) + 0.593(SE) + 0.560(OBI)

U = 0.247(IQ) + 0.468(SysQ) + 0.441(SerQ) + 0.046(U) + 0.983(OBI) + 0.593(SE)

Substitute 3 into 4

Individual Benefit/Impact (IBI) = 0.615(U)

(IBI) = 0.615*(0.247(IQ) + 0.468(SysQ) + 0.441(SerQ) + 0.046(U) + 0.983(OBI) + 0.593(SE))

(IBI) = 0.151(IQ) + 0.287(SysQ) + 0.271(SerQ) + 0.028(U) + 0.604(OBI) + 0.364(SE)

Substitute 4 into 5

Organisation Benefit /Impact (OBI) = 0.742(IBI) + 0.560 (U)

(OBI) = 0.742*(0.151(IQ) + 0.287(SysQ) + 0.271(SerQ) + 0.028(U) + 0.604(OBI) + 0.364(SE)) + 0.560 (U)

(OBI) = 0.112(IQ) + 0.212(SysQ) + 0.201(SerQ) + 0.020(U) + 0.448(OBI) + 0.270(SE)) + 0.415 (U)

(OBI) = 0.112(IQ) + 0.212(SysQ) + 0.201(SerQ) + 0.435(U) + 0.448(OBI) + 0.270(SE)

(OBI) – 0.448(OBI) = 0.112(IQ) + 0.212(SysQ) + 0.201(SerQ) + 0.435(U) + 0.448(OBI) + 0.270(SE)

1 - 0.448(OBI) = 0.112(IQ) + 0.212(SysQ) + 0.201(SerQ) + 0.435(U) + 0.448(OBI) + 0.270(SE)

0.552(OBI) = 0.112(IQ) + 0.212(SysQ) + 0.201(SerQ) + 0.435(U) + 0.270(SE)/0552

(OBI) = 0.112(IQ) /0.552+ 0.212(SysQ) /0.552 + 0.201(SerQ) /0.552 + 0.435(U) /0.552+ 0.270(SE)/0.552

(OBI) = 0.202(IQ)+ 0.384(SysQ) + 0.364(SerQ) + 0.788(U) + 0.489(SE) (6)

Y = 0.202(x)+ 0.384(z) + 0.364(t) + 0.788(a) + 0.489(b)

Where y = OBI, x = IQ, z = SysQ, t= SerQ, a = U, b = SE (7)

The value of organisation benefit/impact is found using the equation (6) below:

(OBI) = 0.202(IQ)+ 0.384(SysQ) + 0.364(SerQ) + 0.788(U) + 0.489(SE) (6),

which indicates the value of success of IS in SMEs the formula has been generalize in equation seven (7).

4.11 Conclusion to Chapter Four

In the above section the prepared data has been evaluated descriptively in the first step, then by considering them proposed model has been tested in two phases for the South African SMEs. Finally, the presumed hypotheses have been analysed through IBM SPSS version 26 software and out of thirteen hypotheses were accepted. In the next chapter, the wrapping up conclusion will be offered for the entire thesis and some recommendations will be presented for further researches.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 Introduction

In this chapter, following the discussion on the findings of this research, the contributions will be named. The research questions posed will be answered, and then the limitations and problems observed in these procedures will be analysed. Finally, some recommendations are suggested for further research.

5.2 Overview

As far as what is emphasized with in the research, the vital role was to measure the success of IS in SMEs in Gauteng. Furthermore, in the assumed hypotheses, the relation among the factors and their influence on each other must be taken into account. For this research, considering the significant role in measuring the success of IS in SMEs, companies were selected for the statistical province specifically SMEs in Gauteng were targeted as the specified population. After identifying a statistical province, the data was gathered through online survey questionnaire. The collected data was processed, and the defectives and outliers removed. Then, based on the proposed model to measure success of IS in SMEs three continuous phases were performed. Firstly, the exploratory phase prepared the data for creating a proposed model. In the next phase the data was divided into two types of validation and fitting data. In the validation process procedure, study chose nine variables for testing the established model. At the end of the confirmatory phase the study extracted the covariance between the constructs and regression. Additionally, in the third phase the hypotheses among the construct were tested. In total thirteen hypotheses have been tested during the research, and all hypotheses were supported or accepted. The below research questions were answered and linked to a specific objective in the following manner:

How can the success of an information system in the small and medium enterprises be measured?

This question was answered successfully in chapter two, the popularity of the D&M model in the academic literature, it seemed appropriate to organise the study of measuring the success of IS in SMEs (McLean and Delone, 2003). Today's SMEs in South Africa face complex and dynamic environments whose characteristics have been attributed to the globalization and competitiveness of the global economy (Sharma et al., 2008). The increasing emergence of new technologies has meant that the topography of the business world tends to change frequently and quickly (Sharma et al., 2008). The present study focused on measuring the success of IS in SMEs. This research revealed that organisation benefit/impact has a positive influence on measuring the success of IS in SMEs. The results show that some of the constructs identified in this study of measuring success of IS in SMEs correlated positively with the IS correlation measures, whereas others suggested an inverse relationship in the surveyed Indian SMEs (Sharma et al., 2008).

What has been done in the literature to measure information system success in the organisation?

A literature analysis has been accomplished to find out the existing theories, models, and measurement tools for measuring the success of IS in SMEs. From this analysis come out that since the beginning of 2008, many researches concentrated upon the identification of factors that influence the success of information systems (Peter et al., 2008). Despite some studies having recently attempted to investigate these subjects with regards to measuring the success of IS in SMEs, research-works in this field are still in an early stage, and moreover, those focused on the study of more complex applications are very few. Therefore, in order to understand the mechanisms of introduction and to measure the success of IS in SMEs, the

models and theories for the determination of success of generic information systems have been analysed (De Toni, 2006). The theories that have been identified can be organised into four main research streams: Delone and Maclean model; Technology acceptance; Task-technology; and Fit - Information Systems Success. However, the literature review has highlighted other models or theories which are related to the three main research streams (Peter et al., 2008). These models are summarized as: total acceptance model, task technology fit, IS success model, theory of reason action, theory of planned action, social learning theory, social cognitive theory, innovation diffusion theory, expectancy theory, and theory of cognitive dissonance (Peter et al., 2008).

What model can be proposed to measure information system success in SMEs Gauteng, South Africa?

The theoretical underpinning chosen for this study is the updated DeLone and McLean (2003) model of IS success. The model propose six major factors of IS success: (1) system quality, (2) information quality, (3) use, (4) user satisfaction, (5) individual impact and (6) organisational impact (Mudzana and Maharaj, 2015). A modification of the model to include service quality was proposed (Rabaa, 2009). The DeLone and McLean (2003) information-systems success model address the weaknesses of the original model. The model consists of the following six factors: system quality, information quality, service quality, use or intention to use, user satisfaction and net benefit. For the purposes of this study, a model has been proposed to measure the success of IS in SMEs using the updated (DeLone and McLean, 2003) model. One of the reasons for this choice was because it was identified as the single most cited IS success model in IS literature (Mudzana and Maharaj, 2015). Furthermore, the Delone and Maclean (2003) model framework has been used extensively in various empirical works on IS success. Empirical work has drawn on the updated Delone and Maclean (2003) model to

measure the success of information system in SMEs. Prior studies confirm the model's usefulness in assessing different IS applications. However, in the South African success measure of IS in SMEs context, the research found no study that has utilised the updated DeLone and McLean (2003) model to measure the success of IS in SMEs.

How can the success of an information system be measured using the proposed model?

Organisation benefit/impact analysis (IBI) is the ideal way of evaluating success measure of IS in SMEs in the proposed model on this basis (Cuellar, 2015). Perhaps the most prominent attempt to evaluate success measure of IS in SMEs on the basis of the proposed model, in the IS field, has been the Delone and McLean IS Success Model, using proposed model which attempt to relate interdependent relationship of nine constructs: (1) system quality; (2) information quality; (3) Service Quality; (4) user satisfaction; (5) intention to use; (6) use and; (7) self-efficacy; (8)individual benefit/impact; and (9) organisation benefit/impact (Cuellar, 2015).

5.3 Findings

The study tested the model derived from Delone and Maclean (2003) model to evaluate how proper it is for organisation benefit/impact, influence the success measure in SMEs. Based on this model nine major constructs were considered and the relation among them tested, although in the exploratory phase due to the gathered and prepared data, the software recommended that the consideration of all nine main constructs. According to the presumed hypotheses in this research, out of thirteen hypotheses, the number of thirteen hypotheses has been accepted. It would appear that according to the filled-out questionnaires and collected data, the nine considered constructs covered the proposed model successfully. The research questions were thus validated to a high degree by finding the required constructs and hypotheses among them and we have created a proper and admissible (acceptable or valid) model in this regard.

5.4 Contributions

The study has an important effort towards a deeper understanding of measuring the success of IS in SMEs. The study contributes to the body of knowledge in measuring the success of IS in SMEs studies. First and foremost, based on the available and updated literature review of SMEs studies in South Africa, this is the first study to utilise and apply the McLean and Delone (2003) model in the context of the local SMEs in South Africa. This study succeeded in validating the proposed model and the supporting relationships among the key variables within the local SMEs context. The study found a sufficient and acceptable degree of hypotheses

5.5 Conclusions

The final purpose of the research was to measure the success of IS in SMEs. Evaluation of the hypothesis among the major construct was tested. To answer the research question, the hypotheses have been tested for offering a proper model for measuring the success of IS in SMEs. Hence during this research, the hypotheses among measuring success of IS in SMEs have been accepted.

5.6 Limitations

Performing a research in South Africa and similar developing countries is quite difficult. Firstly, the shortage of academic's researches and limitations of valuable resources was a major problem the research faced. A very weak relation between industry and business from one side, and university on the other, causes the researcher to have insufficient awareness of the practical problems in the industry and business. It is one of the main reasons why there are many researches with similar topic without any effective application. Unfortunately, in South Africa it is not clear which ministry, organisation or office is responsible for or keeps SMEs. The

situation got exacerbated when the research could not find even a unique definition of an SME. Data gathering was the most trying procedure in this research.

Preparing a list of South African SMEs, accessing their contacts information, finding contact points to get through, explaining the purpose of the research, sending the questionnaires, following up to the person to clarify the questions, are the usual procedures that consume at least four to five minutes in the best scenario in slow South African systems. To buttress the aforesaid, as a valuable list of required SMEs or helpful contact points directory was not available. There were other problems encountered such as nonchalance of secretaries to answer, disinterest of some managers to spare some minutes for checking the questionnaires and even taking time to fill out the questionnaire. It was a very time consuming, and frustrating procedure that rendered the researcher disappointed when respondents returned semi-filled out or carelessly dealt with questionnaires, or even nothing. It is even more painful to consider that these managers would themselves be the ones to benefit from these types of research.

5.7 Further Researches

Considering the significant role of SMEs in the South African economy, further the outstanding location of South Africa in the region or even in the world geopolitically, numerous researches would be required in different aspect. Many factors are not covered in this study are motivating and need to be explored. Additionally, the restraint and shortcomings of this study also provide implications for further research and next researches could add extensions to this study. This research also could do with further analyses. While this research incurs a number of every interesting result, it is believed that there are several things that could be performed to confirm the results as well as to expand the hypothesis. There are numerous factors such as political issues, target market size, developed or developing target markets, internationalization different modes, marketing mix, customer behaviour, and customization vs standardization,

that should be concentrated on in detail. Each of the above factors are very significant and effective to be successful into the markets for South African considerable number of SMEs.

REFERENCES

ALMUTAIRI, H. & SUBRAMANIAN, G. H. 2016. An Empirical Application of the Delone and Mclean Model in the Kuwaiti Private Sector. *Journal of Computer Information Systems,* 45**,** 113-122.

BROEMBSEN, M. V., WOOD, E. & HERRINGTON, M. 2005. Global Entrepreneurship Monitor South African Report. *In:* REPORT, G. E. M. S. A. (ed.) *GEM.* UCT Centre for Innovation and Entrepreneurship: UCT Centre for Innovation and Entrepreneurship.

CRAGG, P., CALDEIRA, M. & WARD, J. 2011. Organisational information systems competences in small and medium-sized enterprises. *Information & Management Journal* 48**,** 353-363.

DELONE, H. W. & MCLEAN, E. R. 1992. Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research,* 3**,** 60-95.

DELONE, W. H. & MCLEAN, E. R. 2003. The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. Journal of Management Information Systems, 19, 9-30.

DELVA, M. D., KIRBY, J. R., KNAPPER, C. K. & BIRTWHISTLE, R. V. 2002. Postal survey of approaches to learning among Ontario physicians: implications for continuing medical education. *Learning in practice,*1, 1-5.

GAUTHIER, B. 2001. Assessing Survey Research A Principled Approach. *In:* CONFERENCE, A. A. F. P. O. R. A. (ed.) *Work-in-Progress Report.* Montréal, Canada: Montréal, Québec.

GAY, L. R., MILLS, G. E. & AIRASIAN, P. 2011. Competencies for Analysis and Applications. *Educational research*.

KUMAR, M., RAMAYAH, T. & TALIB, S. A. 2012. *Business Research Methods,* OXFORD University Press, Kumar, M.

LEVY, M. & POWELL, P. 2000. Information systems strategy for small and medium sized enterprises: an organisational perspective. *Journal of Strategic Information Systems,* 9**,** 63-84.

MARAJOS, A., MICHAEL, E. I. & ROSEMARY, N. O. 2016. Teaching Agricultural Science with Instructional Materials in Secondary Schools; What the Standard Deviation Explains about the Mean Achievement Scores. *Creative Education,* 7**,** 1929-1934.

MARDIANA, S., TJAKRAATMADJA, J. H. & APRIANINGSIH, A. 2015. DeLone–McLean Information System Success Model Revisited: The Separation of Intention to Use - Use and the Integration of Technology Acceptance Models. *International Journal of Economics and Financial,* 2015, 172-182.

MURIITHI, M. 2017. African small and medium enterprises (smes) contributions, challenges and solutions. *European Journal of Research and Reflection in Management Sciences,* 5, 2-14.

SANTARELLI, E. & VIVARELLI, M. 2007. Entrepreneurship and the process of firms' entry, survival and growth. *Industrial and Corporate Change,* 16**,** 455-488.

SHARMA, M. K., BHAGWAT, R. & DANGAYACH, G. S. 2008. Performance measurement of information systems in small and medium sized enterprises: a strategic perspective. *Production Planning & Control,* 19, 1-14.

THOMAS, P. Information Systems Success and Technology Acceptance within Government Organisation. Americas Conference on Information Systems, 2006 University of North Texas. AIS Electronic Library.

WU, J. H. & WANG, Y. M. 2006. Measuring KMS success: A respecification of the DeLone and McLean's model. *Information & Management* 43**,** 728-739.

ALSHARDAN, A., GOODWIN, R. & RAMPERSAD, G. 2013. Measuring the benefits of IS in small organisations in developing countries. *International Journal of Conceptions on Computing and Information Technology,* 1**,** 12-17.

ALSHARDAN, A., GOODWIN, R. & RAMPERSAD, G. 2016. A Benefits Assessment Model of Information Systems for Small Organisations in Developing Countries. *Computer and Information Science,* 9**,** 1-8.

AMANKWAA, L. 2016. CREATING PROTOCOLS FOR TRUSTWORTHINESS IN QUALITATIVE RESEARCH. *Journal of Cultural Diversity,* 23**,** 121-127.

AMEEN, A., AL-ALI, D., ISAAC, O. & MOHAMMED, F. 2020. Examining relationship between service quality, user satisfaction, and performance impact in the context of smart government in UAE. *International Journal of Electrical and Computer Engineering (IJECE),* 10**,** 1-8.

ANDARWATI, M., ZUHROH, D. & AMRULLAH, F. 2020. Determinants of Perceived Usefulness and End-User AccountingInformation System in SMEs. *international Journal of Advanced Science and Technology,* 29**,** 46-61.

ARSHAD, M. Z., MEIRUN, T., JAVAID, M., ALI, M., ARSHAD, M. H. & MANEERA, C. 2020. The Importance of Learning Orientation and Entrepreneurial Orientation on SMEs Performance. *International Journal of Disaster Recovery and Business Continuity,* 11**,** 1-9.

BAHADDAD, A. A. 2017. Evaluating M-Commerce Systems Success: Measurement and Validation of the DeLone and McLean Model of IS Success in Arabic Society (GCC Case Study). *Journal of Business Theory and Practice,* 5**,** 2329-2644.

BHAGWAT, R. & SHARMA, M. K. 2007. Information system architecture: a framework for a cluster of small- and medium-sized enterprises (SMEs). *Production Planning & Control,* 18**,** 283-296.

BROEMBSEN, M. V., WOOD, E. & HERRINGTON, M. 2005. Global Entrepreneurship Monitor South African Report. *In:* REPORT, G. E. M. S. A. (ed.) *GEM.* UCT Centre for Innovation and Entrepreneurship: UCT Centre for Innovation and Entrepreneurship.

CALDEIRA, M. M. & WARD, J. M. 2002. Understanding the successful adoption and use of IS/IT in SMEs: an explanation from Portuguese manufacturing industries. *Info Systems Journal,* 2002**,** 121–152.

CHATTERJEE, S. & KAR, A. K. 2020. Why do small and medium enterprises use social media marketing and what is the impact: Empirical insights from India. *International Journal of Information Management,* 53**,** 1-18.

CHAWLA, G. 2015. Sustainability in Hospitality Education: A Content Analysis of the Curriculum of British Universities. *Swiss Hotel Management School,* 15**,** 135-139.

CHTO, P., TENGEH, R. K. & IWI, C. G. 2016. Daring to survive or to grow? the growth aspirations and challenges of survivalist entreprenuers in South Africa. *Environmental economics,* 2014**,** 93-101.

CUELLAR, M. J. 2015. A Reconceptualization of the Concept of Project Success at the Organisational Level *JAIS Theory Development Workshop* 15**,** 1-42.

DE SILVA, C. 2017. *Principal component analysis (PCA) as a statistical tool for identifying key indicators of nuclear power plant cable insulation degradation.* Materials Science and Engineering Commons, Iowa State University Capstones.

DE TONI, A. F. 2006. *MEASURING INFORMATION SYSTEMS SUCCESS: A LITERATURE REVIEW.* Management Engineering Laboratory, , University of Udine.

DEHBOKRY, S. G. & CHEW, E. 2015. Toward a Multi-disciplinary Business Architecture Reference Model for SMEs. *Association for Information Systems AIS Electronic Library (AISeL),* 5**,** 1-18.

DEHKORDI, E. S. 2008. *A Model for Succeffful Presence of Iranian SMEs in International Makers* Marketing and e-commerce Lulea University of Technology

ENSARI, M. S. & KARABAY, M. E. 2014. What Helps to Make SMEs Successful in Global Markets? *10th International Strategic Management Conference,* 150**,** 192-201.

ERDIN, C. & OZKAYA, G. 2020. Contribution of small and medium enterprises to economic development and quality of life in Turkey. *Faculty of Economics and Administrative Sciences, Department of Business Administration,* 2**,** 1-15.

FISEHA, G. G. & OYELANA, A. A. 2015. An Assessment of the Roles of Small and Medium Enterprises (SMEs) in the Local Economic Development (LED) in South Africa. *Journal of Economics* 6**,** 280-290.

FORKAN, G. 2010. Factors affecting business success of small & medium enterprises (SMEs). *Sri Krishna International Research & Educational Consortium* 1**,** 1-16.

FREFER, A. A., MAHMOUD, M., HALEEMA, H. & ALMAMLOOK, R. 2018. Overview Success Criteria and Critical Success Factors in Project Management. *Industrial Engineering & Management,* 7**,** 1-6.

GAMAGE, S. K. N., EKANAYAKE, E., ABEYRATHNE, G., PRASANNA, R., JAYASUNDARA, J. & RAJAPAKSHE, P. 2020. A Review of Global Challenges and Survival Strategies of Small and Medium Enterprises (SMEs). *Economies,* 8**,** 1-24.

GHOBADIAN, A., SPELLER, S. & JONES, M. 2000. Service Quality Concepts and Models. *International Journal of Quality & Reliability Management,* 11**,** 43-66.

GHOBAKHLOOA, M. & TANGA, S. H. 2015. Information system success among manufacturing SMEs: case of developing countries. *Information Technology for Development,* 21**,** 573-600.

GONCALVES, J. M. 2018. A multiple criteria group decision-making approach for the assessment of small and medium-sized enterprise competitiveness. *Management Decision* 57**,** 480-500.

GORLA, N., SOMERS, T., M. & WONG 2010. Organisational impact of system quality, information quality,and service quality. *Journal of Strategic Information Systems,* 19**,** 207–228.

GOUNDAR, S. 2012. Research Methodology and Research Method. *Research Methodology and Research Method.* Victoria University of Wellington

HALEEM, F., JEHANGIR, M. & ULLAH, Z. 2019. Strategic Planning and SMEs Performance: A Developing Country's Perspective. *Journal of Business & Economics,* 11**,** 33-49.

HALL, H. 2004. The knowledge trap: an intranet implementation in a corporate environment. *an intranet implementation in a corporate environment* 2004**,** 1-32.

HEO, J. & HAN, I. 2003. Performance measure of information systems (IS) in evolving computing enviroments: an empirical investigation *Information system and Management* 40**,** 243-256.

KATUA, N. T. 2014. The Role of SMEs in Employment Creation and Economic Growth in Selected Countries. *International Journal of Education and Research* 2**,** 1-12.

KHASKHELI, A., JUN, Y. & SANJRANI, H. 2016. Role of E-Commerce in Export Development for SMEs in Developing Countries. *European Journal of Business and Management,* 8**,** 1-4.

KIM, Y. J., GARRITY, E. J. & SANDERS, G. L. 2016. Success Measures of Information Systems. *Information Resources Management Journal,* 4**,** 1-16.

KORNBERGER, M. & MANTERE, S. 2020. Thought Experiments and Philosophy in Organisational Research. *Organisation Theory,* 1**,** 1-19.

KOTHARI, C. 2011. Research Methodology; Methods and Techniques. *In:* DELHI, N. (ed.) *Research Methodology; Methods and Techniques.* New Age International Publishers.

KRUJA, A. D. 2013. The Contribution of SMEs to the Economic Growth (Case of Albania). *Department of Business Administration, Lecturer,* 23**,** 1-13.

LEVY, M. & POWELL, P. 2000. Information systems strategy for small and medium sized enterprises: an organisational perspective. *Journal of Strategic Information Systems,* 9**,** 63-84.

LUKYANENKO, R., WIGGINS, A. & ROSSER, H. K. 2020. Citizen Science: An Information Quality Research Frontier. *Information Systems Frontiers,* 22**,** 1-123.

MANFREDA, K. L., PETRIC, G. & PETROVCIC, A. 2016. The effect of email invitation elements on response rate in a web survey within an onlnine community. . *Computers in Human Behaviours,* 56**,** 320 -329.

MANNING, S. G. 2015. *THE DEVELOPMENT AND VALIDATION OF A MEASURE OF DISENGAGEMENT.* In partial fulfillment of the requirements For the Degree of Master of Science, Colorado State University.

MARAJOS, A., MICHAEL, E. I. & ROSEMARY, N. O. 2016. Teaching Agricultural Science with Instructional Materials in Secondary Schools; What the Standard Deviation Explains about the Mean Achievement Scores. *Creative Education,* 7**,** 1929-1934.

MCLEAN, E. R. & DELONE, W. H. 1992. Information Systems Success: The Quest for the Dependent Variable. *Information system success Information systems assessment Measurement* 3**,** 1-37.

MCLEAN, E. R. & DELONE, W. H. 2003. The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems,* 19**,** 9-30.

MENDENHALL & BOUDREAU. 2012. *Talent Management and Expatriation: Bridging two streams of research and practice.* Masters Talent Management and Expatriation, ESSEC Business School.

MERIOUH, Y. A. L. & HANAEROKY 2015. Evaluation by users of an industrial information system (XPPS) based on the DeLone and McLean model for IS success. *4th World Conference on Business, Economics and Management, WCBEM,* 26**,** 903-913.

MORINA, D. & GASHI, P. 2016. THE ROLE OF SMEs ON THE ECONOMIC DEVELOPMENT: KOSOVA's CASE. University Haxhi Zeka Peja: University Haxhi Zeka Peja.

MOSTERT, K. 2015. A structural model of job resources, organisational and individual strengths use and work engagement. *SA Journal of Industrial Psychology ·,* 40**,** 1-12.

MUDZANA, T. & MAHARAJ, M. 2015. Measuring the success of business-intelligence systems in South Africa: An empirical investigation applying the DeLone and McLean Model. *South African Journal of Information Management,* 17**,** 17.

MUGENDA, O. M. & MUGENDA, A. G. 2012. Research Methods: Quantitative and Qualitative Approaches. Nairobi: Acts Press. *Research Methods.* Nairobi: Acts Press.

MURIITHI, M. 2017. African small and medium enterprises (smes) contributions, challenges and solutions. *European Journal of Research and Reflection in Management Sciences,* 5**,** 1-3.

MWANGI, M., GEORGE, G. E., MINDILA, R., NYAKWARA, S., ONGERI, J. & OKEYO, H. N. 2013. An Evaluation of Financing and Development of Small and Medium Enterprises in Mombasa County, Kenya *European Journal of Business and Management* 5**,** 1-3.

NAJIB, M. & FAHMA, F. 2020. Investigating the Adoption of Digital Payment System through an Extended Technology Acceptance Model: an Insight from the Indonesian Small and Medium Enterprises. *International journal on advanced science engineering information technology* 10**,** 1-7.

NDIAYE, N., RAZAK, L. A., NAGAYEV, R. & NG, A. 2018. Demystifying small and medium enterprises'(SMEs) performance inemerging and developing economies. *International Centre for Education in Islamic Finance (INCEIF), Lorong Universiti A, 59100 Kuala Lumpur, Malaysia,* 18**,** 269-281.

NUNKOO, R., TEEROOVENGADUMA, V., RINGLE, C. M. & SUNNASSEE, V. 2020. Service quality and customer satisfaction: The moderating effects of hotel star rating. *International Journal of Hospitality Management,* 91**,** 1-15.

OMAR, S. S. B., AROKIASAMY, L. & ISMAIL, M. 2019. The Background and Challenges Faced by the Small Medium Enterprises. A Human Resource Development Perspective. *International Journal of Business and Management,* 4**,** 1-9.

PETER, S., MCLEAN, E. & DELONE, W. 2008. Measuring information systems success: models, dimensions, measures and interrelationships. *European Journal of Information Systems,* 17**,** 236-263.

PRIVITERA, G. J. 2013. *Research methods for the behavioural sciences. Sage Publications.*, Sage Publications.

RABAA, A. 2009. *Assessing Information Systems Success Models: Empirical Comparison.* 12, American University of Kuwait.

RAJAN, C. A. & BARAL, R. 2015. Adoption of ERP system: An empirical study of factors influencing the usage of ERP and its impact on end user. *IIMB Management Review,* 27**,** 105-117.

SAADAN, K. B., YOUSIF, N. B. & RAMDAN, S. M. A. 2014. E-Government Systems Success Evaluating under Principle Islam: A Validation of the Delone and Mclean Model of Islamic Information Systems Success. . *Academic Research International,* 5**,** 1-14.

SALIKIN, N., WAHAB, N. A. & MUHAMMAD, I. 2013. Strengths and Weaknesses among Malaysian SMEs: Financial Management Perspectives *International Conference on Innovation, Management and Technology Research,* 129**,** 1-7.

SANTARELLI, E. & VIVARELLI, M. 2007. Entrepreneurship and the process of firms' entry, survival and growth. *Industrial and Corporate Change,* 16**,** 455-488.

SARMENTO, R. & COSTA, V. 2019. Confirmatory Factor Analysis A Case study. *Factor Analysis* 19**,** 1-39.

SCHENKEL, M. T., FARMER, S. & MASLYN, J. M. 2019. Process improvement in SMEs: The impact of harmonious passion for entrepreneurship, employee creative self-efficacy, and time spent innovating. *Journal of Small Business Strategy,* 29**,** 1-14.

SHARMA, M. K. & BHAGWAT, R. 2006. Performance measurements in the implementation of information systems in small and medium-sized enterprises: a framework and empirical analysis. *Measuring business excellence,* 10**,** 8 - 21.

SHARMA, M. K., BHAGWAT, R. & DANGAYACH, G. S. 2008. Performance measurement of information systems in small and medium sized enterprises: a strategic perspective. *Production Planning & Control,* 19**,** 1-9.

SINGH, A. S. & MASUKU, M. B. 2014. Sampling techniques and determination of sample size in applied statistics research:an overview. *nternational Journal of Economics, Commerce and Management,* 2**,** 1-22.

STEVEN, M. L. E., SANJIB, E. & ALAM, C. I. 2007. Tacit knowledge sharing, self-efficacy theory, and application to the Open Source community. *Journal of Knowledge Management,* 11**,** 92-103.

SUKARMIJAN, S. S. & SAPONG, O. D. V. 2013. The Importance of Intellectual Property for SMEs; Challenges and Moving Forward

International Agribusiness Marketing 1**,** 74-81.

TANGA, S. H. & GHOBAKHLOOA, M. 2015. Information system success among manufacturing SMEs: case of developing countries. *Information Technology for Development,* 2015**,** 1-30.

TAVAKOL, M. & DENNICK, R. 2011. Making sense of Cronbach's alpha. *International Journal of Medical Education,* 2011**,** 53-55.

TERZIOVSKI, M. 2010. INNOVATION PRACTICE AND ITS PERFORMANCE IMPLICATIONS IN SMALL AND MEDIUM ENTERPRISES (SMEs) IN THE MANUFACTURING SECTOR: A RESOURCE-BASED VIEW. *Strategic Management Journal,* 21**,** 892-902.

TWYCROSS, A. & HEALE, R. 2015. *Validity and reliability in quantitative studies.* Health and Social Care, South Bank University

WANG, Y. & LIAO, Y. 2007. Assessing eGovernment systems success:A validation of the DeLone and McLean model of information systems success. *Government Information Quarterly,* 25**,** 717–733.

WANG, Y. S. & LIAO, Y. W. 2008. Assessing eGovernment systems success: A validation of the DeLone and McLean model of information systems success. *Government Information Quarterly,* 25**,** 717–733.

WILSON, J. 2013. A guide to doing your research project *Essentials of business research* Los Angels: Wison

WONG, M. N. 2017. *Barriers to Customer Participation in Mobile Banking In the Case of Hong Kong* Business Administration Masters Thesis Karlstad University

WU, J. H. & WANG, Y. M. 2006. Measuring KMS success: A respecification of the DeLone and McLean's model. *Information & Management* 43**,** 728-739.

WYMA, L. 2010. *Consumers' preferences for private and national brand food products.* Mini-dissertation submitted in partial fulfilment of the requirements for the degree Magister in Consumer Sciences, North-West University.

YAKUBU, M. N. & DASUKI, S. I. 2018. ASSESSING ELEARNING SYSTEMS SUCCESS IN NIGERIA: AN APPLICATION OF THE DELONE AND MCLEAN INFORMATION SYSTEMS SUCCESS MODEL. *Journal of Information Technology Education: Research,* 17**,** 182-202.

YOSHIKUNI, A. C. & ALBERTIN, A. L. 2018. Effects of strategic information systems on competitive strategy and performance. *International Journal of Productivity and Performance Management,* 67.

YU, P. & QIAN, S. 2018. Developing a theoretical model and questionnaire survey instrument to measure the success of electronic health records in residential aged care. PLoS One. *Measuring the success of EHR in residential aged care,* 13**,** 1-18.

ZWIKAEL, O. & MEREDITH, J. R. 2019. Evaluating the Success of a Project and the Performance of Its Leaders. *IEEE Transactions on Engineering Management* 1**,** 1-13.

APPENDICES

APPENDIX A: PART A: QUESTIONNAIRE

Measuring the success of information system in small and medium enterprises in South Africa

PART A: PARTICIPANTS DEMOGRAPHICS

Q1. Your Name_____ (Optional)

Q2. Please indicate your gender by ticking the appropriate box.

- ○ Male
- ○ Female

Q3. Please indicate your age by ticking the appropriate box.

- ○ Below 25 years
- ○ 25 – 34 years
- ○ 35 – 44 years
- ○ 45 – 54 years
- ○ 55 – 64 years
- ○ 65 years and above

Part B: CONSTRUCT OF THE COMBINATION OF TASK- Delone and MacLean Model (McLean and Delone, 2003)

Section 1					
Information Quality	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
IQ1.Information from the system is relevant to my work.	1	2	3	4	5
IQ2. Information I get from the system is accurate.	1	2	3	4	5
IQ3. Information is easy to understand from the system.	1	2	3	4	5
IQ4. The information is presented in a useful format.	1	2	3	4	5
Section 2					
System Quality	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
SysQ1. The system is easy to use.	1	2	3	4	5
SysQ2. The system is useful.	1	2	3	4	5
SysQ3. The system is easy to learn.	1	2	3	4	5
SysQ4.I can retrieve information I need easily.	1	2	3	4	5
Section 3					

Service Quality	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
SerQ1. The support services for the system are dependable.	1	2	3	4	5
SerQ2. The support services give me individual attention.	1	2	3	4	5
SerQ3. Overall, the support services meet my needs.	1	2	3	4	5
Section 4					
User satisfaction	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
US1. Overall, I am satisfied with the system.	1	2	3	4	5
US2. This information system is more useful than I had expected	1	2	3	4	5
US3. This information system assists me in performing my tasks better.	1	2	3	4	5
US4. This information system is extremely useful.	1	2	3	4	5
US5. Using this information system enables me to accomplish tasks more quickly.	1	2	3	4	5

US6. This information system makes it easier to do my tasks.	1	2	3	4	5
US7. This information system improves the quality of my decision making.	1	2	3	4	5
US8. Use of the information system enables me to make better decisions.	1	2	3	4	5
US9. This information system assists me in making decisions more effectively.	1	2	3	4	5
US10. Use of the information system enables me to set my priorities in decision making.	1	2	3	4	5
Section 5					
Intention to Use	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
ITU1. You intend to use any IS application.	1	2	3	4	5
ITU2. You will reuse the IS applications in the future.	1	2	3	4	5
ITU3. You will use the IS applications frequently in the future.	1	2	3	4	5
ITU4. Learning to use this information system was easy for me.	1	2	3	4	5

ITU5. I found it easy to get this information system to do what I want it to do.	1	2	3	4	5
ITU6. My interaction with this information system was clear and understandable.	1	2	3	4	5
ITU7. It would be easy for me to become skilful at using this information system.	1	2	3	4	5
Section 6					
Use	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
U1. How many minutes per shift do you spend on the system?	1	2	3	4	5
U2. How many times a shift do you log on to the system?	1	2	3	4	5
U3. How many functions in the system have you used?	1	2	3	4	5
Section 7					
Individual impact	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

II1. Management relies a great deal on me to ensure proper operation or processing when I use the system.	1	2	3	4	5
II2. Much is left to my discretion to ensure proper operation or processing when I use the system.	1	2	3	4	5
II3. I have considerable autonomy in deciding how to carry out my work.	1	2	3	4	5
II4. The procedures to carry out a task are spelled out very clearly.	1	2	3	4	5
II5. If there is an error, it is very easy for my supervisor to trace when, where, and by whom it was committed through the IS system.	1	2	3	4	5
Section 8					
Organisational impact	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
OI1. I know where to turn to when I need any assistance with our IS success.	1	2	3	4	5
OI2. In my company we get good technical support for our IS.	1	2	3	4	5

OI3. We have extensive support to help with problems related to our IS.	1	2	3	4	5
OI4. Management is aware of the benefits that can be achieved with the use of IS.	1	2	3	4	5
OI5. Management provides most of the necessary help and resources to enable people to use IS.	1	2	3	4	5
OI6. Management is really keen to see that people are happy with using IS.	1	2	3	4	5
Section 9					
Net Benefit	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
NB1. The product service of the IS application system is a good value for the money.	1	2	3	4	5
NB2. The price of the product or service of the IS application system is acceptable.	1	2	3	4	5
NB3. The time spent in the IS application system is appropriate.	1	2	3	4	5
Section 10					
Self-efficacy	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

SE1. When I enter data into the computer, I feel confident about what I am doing.	1	2	3	4	5
SE2. I feel comfortable to use the system.	1	2	3	4	5

Thank you for taking the time to complete the questionnaire

APPENDIX B: INVITATION LETTER

Measuring the success of information system in small and medium enterprises in South Africa

RESEARCH INVITATION LETTER

Dear _____,

I am pleased to invite you to participate in a research aimed at measuring the success of IS on SMEs in South Africa

Not more than fifteen minutes would be required to complete the questionnaire.

Be assured that any information you provide will be treated in the strictest confidence and your participation will not be identifiable in the resulting report. You are entirely free to discontinue your participation at any time or to decline to answer particular questions.

I will seek your consent, on the attached form on which I commit to ensure that your name or identity is not revealed.

Thank you for your assistance.

Mr. L. Willie, Researcher,

Email: lungstar22@gmail.com Cell: 0636130820

Vaal University of Technology, South Africa

APPENDIX C: CONSENT LETTER

RESEARCH TITLE: Measuring Success of Information System in Small and Medium Enterprises in Gauteng South Africa.

I have read the information presented in the information letter about a study being conducted by **Lungile Willie** towards the Master's High Degree Programme at the faculty of Applied and Computer Science at the Vaal University of Technology. This study has been described to me in a language that I understand and I freely and voluntary agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and was informed that I may withdraw my consent at any time by advising the student researcher. With full knowledge of all foregoing, I agree to participate in this study.

Supervisor Name:

Supervisor Signature:

Mobile Number (Optional):

Date :

Researcher Name: Lungile Willie

Researcher Signature: L. Willie

Student Number: 210068744

Mobile Number: 0636130820

Email: lungstar22@gmail.com

Institution: VUT

Telephone: 0169507587

Fax: 0169509793

Email: zuvat@vut.ac.za