MEASURING THE EFFECTIVENESS OF BANKING E-BUSINESS SYSTEMS IN SOUTH AFRICA

by

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	December 2017
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ABSTRACT

When the effectiveness of a system is considered, most measurements and research papers tend to report findings from the perspective of the "owners" or creators of such systems. With e-business solutions, it seems to follow the same inward focused tendency. Relatively little research is available to measure the effectiveness of systems from the perspective of a user **outside** the boundaries of the source of the measured system. Similarly, limited research is available when it comes to measuring the effectiveness of **e-business** solutions, more so for **electronic banking** systems. This research aims to address that lack by attempting to determine the effectiveness of specifically e-banking solutions in several different economic sectors, as used by businesses in South Africa. The research approach is three-fold. Firstly, a survey was conducted listing 32 factors which needed to be rated between one and seven on a Likert scale with 1 being the lowest and seven the highest rating. Each factor was rated twice, namely to determine the **Importance** as well as the **Actual** experience of the e-banking system. These factors are analysed to determine correlation coefficient and standard deviations in nine different categories. The methodology used was TAM. Secondly, a systematic research of available literature was conducted and analysed on several criteria. These findings were then compared against the outcomes of the research survey to determine the similarity and differences. Where large differences were found between outcomes, it is raised as possible future research topics. A third and last comparison was done against research which was published in 1987, conducted in the financial sector in South Africa, to determine the effectiveness of information systems used within these organisations (Miller and Doyle, 1987). The research was done using the Critical Success Factor Methodology. Again, the purpose was to determine the similarities and differences between the research survey conducted in this paper to the results obtained in 1987. A conclusion is then reached based on the outcome of these comparisons to determine if the research questions and hypotheses were satisfactorily supported. By comparing the questionnaire results to previous research conducted using TAM on electronic banking, a positive and supporting correlation was displayed on similar variables. The second comparison against nine categories of measurement done by Miller and Doyle (1987), displayed a very strong positive correlation and equivalent outcomes.

Keywords:

E-business, e-banking, effectiveness measurement, solutions, economic sectors, Business banking, South Africa, TAM, UTAUT, banking systems.

"*Time utilization and effectiveness are major markers for success*"

— **Sunday Adelaja**

_____

"*The ultimate measurement is **effectiveness**, not efficiency*."

Jack J. J. Phillips (2012)

Accountability in Human Resource Management. p. 175

1 INTRODUCTION

1.1 BACKGROUND

Over time it became customary for organisations to attempt to measure the performance of their Information Systems used and the functions supporting it. This desire to measure the performance is necessary to determine if the systems and the functions supporting them are achieving the results which were initially planned and expected. One such measure is aimed at measuring the effectiveness of information systems. An early attempt to measure the effectiveness of information systems was designed by Miller and Doyle (1987) for use in the financial services sector. The methodology developed by Miller and Doyle was also applied in inter-industry comparisons, as well as further longitudinal research studies. Other researchers have forwarded work, recently more specifically targeted towards web-based systems (Mahmood et al., 2008, Liebmann, 2001, Ha and Forgionne, 2006). In particular a study by Amit and Zott (2001) found that successful e-business hinged on four dimensions, namely efficiencies, complementaries, lock-in and novelty. Each of these four dimensions is important, with efficiencies and novelty seeming to be correlated higher to e-business success than the other two dimensions. Efficiency is closely related to the dimension of effectiveness chosen as the subject of this research study, since it is grounded in the core ERP or source systems used by both supplier and client organisations. In addition, several studies and methodologies were already developed to measure the effectiveness of information systems, one of the measures included being the efficiency of the overall solution.

In the quoted cases the measurements of effectiveness, profit or other measures of gain seem to be studied from the perspective of the organisation where the system originated. There seems to be an absence or shortage of studies where the effectiveness of the systems, particularly externally targeted systems like e-business or e-trading systems, is studied and documented from the perspective of the using or client organisation outside the boundaries of the owner of such systems.

1.2 THE SOUTH AFRICAN BANKING ENVIRONMENT

On the South African Reserve Bank website (SARB, 2017) a total of 63 banks are registered in South Africa. These banks are listed below in categories as they are presented on the SARB web site. Contact details were removed from these Tables.

Table 1 - Branches of Foreign Banks

Institution	Web Address
Bank of Baroda	www.bankofbaroda.com
Bank of China Limited Johannesburg Branch (trading as Bank of China Johannesburg Branch)	www.boc.cn
Bank of India	
Bank of Taiwan South Africa Branch	www.bot.com.tw/english
BNP Paribas SA	www.bnpparibas.com
Canara Bank	www.canarabank.com
China Construction Bank Corporation - Johannesburg Branch	http://www.ccbjhb.co.za
Citibank N.A.	http://www.citigroup.com
Deutsche Bank AG	http://www.db.co.za
HSBC Bank plc - Johannesburg Branch	http://www.hsbc.co.za
Icici Bank Limited	www.icicibank.com
JPMorgan Chase Bank, N.A. (Johannesburg Branch)	http://www.jpmorgan.com
Société Générale	http://www.socgen.com
Standard Chartered Bank - Johannesburg Branch	http://www.standardchartered.com
State Bank of India	http://www.statebank.co.za

Table 2 - Foreign Bank Representatives

Institution	Web Address
AfrAsia Bank Limited	www.afrasiabank.com
Banco BIC	
Banco BPI, SA	
Banco Santander Totta S.A.	
Bank of America, National Association	
Bank One Limited	
Banque SYZ SA	
CaixaBank	
Commerzbank AG Johannesburg	
Doha Bank	
Ecobank Ghana Limited	
Export-Import Bank of India	www.eximbankindia.com
Hellenic Bank Public Company Limited	http://www.hellenicbank.com

Institution	Web Address
Industrial and Commercial Bank of China African Representative Office	
KfW Ipex-Bank GmbH	
Millenium BCP	
Mizuho Bank Limited	
National Bank of Egypt	
Notenstein Private Bank Limited	
Novo Banco	
Société Générale Representative Office for Southern Africa	http://www.socgen.com
Sumitomo Mitsui Banking Corporation	http://www.smbcgroup.com
Swedbank AB (Publ)	
The Bank of New York Mellon	
The Bank of Tokyo-Mitsubishi UFJ, Ltd	
The Mauritius Commercial Bank Limited	
The Rep. Off. for Southern and Eastern Africa of The Export-Import Bank of China	
Unicredit Bank AG	http://www.hvbgroup.com
Wells Fargo Bank, National Association	
Zenith Bank Plc	

Table 3 - Foreign Controlled Banks

Institution	Web Address
ABSA Bank Limited	http://www.absa.co.za
Albaraka Bank Limited	http://www.albaraka.co.za
Habib Overseas Bank Limited	http://www.habiboverseas.co.za
HBZ Bank Limited	http://www.hbzbank.co.za
Mercantile Bank Limited	http://www.mercantile.co.za
The South African Bank of Athens Limited	http://www.bankofathens.co.za

Table 4 - Locally Controlled Banks

Institution	Web Address
African Bank Limited (reg no: 2014/176899/06)	www.africanbank.co.za
Bidvest Bank Limited	http://www.bidvestbank.co.za

Institution	Web Address
Capitec Bank Limited	http://www.capitecbank.co.za
FirstRand Bank Limited	http://www.firstrand.co.za
Grindrod Bank Limited	www.grindrodbank.co.za
Investec Bank Limited	http://www.investec.com
Nedbank Limited	www.nedbank.co.za
Sasfin Bank Limited	http://www.sasfin.co.za
The Standard Bank of South Africa Limited	http://www.standardbank.co.za
UBANK Limited	http://www.ubank.co.za

Table 5 - Mutual Banks

Institution	Web Address
Finbond Mutual Bank	www.finbondmutualbank.co.za
GBS Mutual Bank	http://www.gbsbank.co.za
VBS Mutual Bank	www.vbsmutualbank.co.za

Since this research paper is concerned with banking services used by South African businesses, it is necessary to concentrate on the business banking services offered by South African banks to these clients. In this context, the South African banks are typically grouped as the “big five” and the rest. Several institutions study and publish research results annually on the South African banking industry as well as ranking on a variety of criteria. The five banks considered as the leading group are Standard Bank of South Africa, Barclays / ABSA Bank, FirstRand Bank which is better known by the brand name of First National Bank (FNB), Nedbank and recently Capitec Bank. Capitec does not offer business banking and very few business solutions, hence did not influence this research. The volume and value of transactions conducted by the “big five” overshadow the rest of the banks in size and value to the extent that the smaller banks are ignored when statistics are reported (BusinessTech, 2017, PricewaterhouseCoopers, 2017).

1.3 HOW IS BUSINESS BANKING DIFFERENT FROM RETAIL BANKING?

The nature of individual banking is very different to that of a business. An individual person has the odd bank transaction, mostly concentrated around the end of the month when bills need to be paid and monthly purchases are done. The larger the business, clearly the higher the volume of transactions to be processed. In very large corporate businesses, it is

common to find thousands of transactions processed in a day. There is often a need to conduct financial transactions across country borders. This volume of transactions goes for both payments and receipts. Invariably the value of these business transactions is much higher than the typical individual's transaction value. Flowing from this, the demands from businesses regarding online banking is more intensive than for individuals. Many businesses operate 24 hours per day, seven days per week, for example fuel stations, hospitals and several other businesses. In the usual retail type businesses, such as liquor stores, grocery stores and the large hyperstores, the amount of cash flowing through the cash drawers is a huge amount of money. To purchase stock and continue trading, the businesses require to have sufficient funds in their banks accounts and need to know this almost immediately before an order can be placed with a supplier.

The functionality offered by banks for business clients vary from bank to bank. The core functions are typically the same, some of which are:

- Cheque and credit card accounts,
- Access to loan facilities,
- Foreign exchange transactions and forward cover negotiations,
- Point of Sale terminals for card transactions,
- Bulk cash solutions, and
- Fleet Services.

Value-add services are typically where differentiation takes place. These services can be determined and studied on the various banking websites (Nedbank, 2017, FNB, 2017, SBSA, 2017, ABSA, 2017). These value-add services include, but are not limited to:

- E-Wallet Pro,
- Online accounting software for free use by clients,
- Online Payroll software for free use by clients, and
- Around-the-clock business help desk.

1.4 PROBLEM STATEMENT

The apparent lack of measurement of e-business systems' effectiveness, specifically considering the perceptions of the customer community using these systems, creates an opportunity for further research and documentation. It also provides an opportunity to

develop an instrument which can be used to measure future effectiveness improvements over a period time, using longitudinal studies. These longitudinal studies can prove very useful to determine if the effectiveness of e-business systems improve because of continuous system expansion and improvement, as well as with client engagement as a catalyst to propel externally facing systems' improvements. It needs to be added that the above description requires a predictable and standardised system to serve as a basis for this study. Electronic banking systems (e-banking) is a type of e-business system which fits this requirement with distinction. It is generally used in almost all businesses of various sizes, as well as being used by individuals. It is currently local and global, covers almost all languages, political systems and all hours of the day. For these reasons, it was decided to focus the study on e-banking systems as the constant, representing an e-business system.

The problem statement is therefore verbalised as:

The effectiveness of banking e-business systems being used in South Africa by businesses in different economic sectors, is not well known or documented.

1.5 RESEARCH QUESTION

Based on the problem statement above and supported after a review of existing literature, the research question almost asks itself:

How effective are current electronic banking systems used in South Africa, based on client experience?

Some sub-questions which are formulated from the main research question are:

- How can "effectiveness" of e-banking systems be quantified in a standardised and understandable manner?
- Can an objective method of measuring effectiveness guide the creators of e-banking solutions, to create outward facing electronic banking systems with an increased probability of acceptance by a wider business audience?

1.6 RESEARCH OBJECTIVES

It is planned to achieve the following objectives with this research study:

i. Determine the effectiveness of e-banking systems from the perspective of the end-user, represented by a mix of businesses in South Africa.
ii. Correlate this effectiveness findings with similar findings obtained from previous research.
iii. Obtain an understanding of the different methods used to measure effectiveness of systems, particularly considering the reliability and repeatability of each method.

1.7 DELINEATION AND LIMITATIONS

The following limitations/delineations are present in this study.

- The study is limited to the Republic of South Africa only.
- A mixture of businesses is included, which may possibly cause skewing of survey results in favour of some industry sectors.
- Electronic banking (e-banking) has been selected as the e-business system of choice. It presents a relatively constant and wide-spread external facing system that provides similar functionality across all industries. The outcome from this research cannot be generalised to other types of e-business systems, for instance Logistics, Security, Education, Travelling, etc.

1.8 DEFINITION OF TERMS AND CONCEPTS

Table 6 - Terms and Concepts

TERM	DESCRIPTION
B2B	An abbreviation for business-to-business electronic interaction.
B2C	Represents business-to-consumer electronic transaction processing systems, typically designed and executed using the internet through browser or APP interfaces.
IT	A generally used abbreviation for Information Technology.
IS	A general abbreviation for Information Systems, sometimes erroneously used as a synonym for IT.
MIS	Management Information Systems
TAM	Technology Acceptance Model

TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology
TPB	Theory of Planned Behaviour

1.9 SIGNIFICANCE

Based on the study of existing literature, it is reasonable that the effectiveness measurement of systems, and specifically e-business systems, is particularly biased towards the originator or supplier of the system. This leaves a gap to measure the effectiveness of the same systems, but from the perspective of the clients who are using these e-banking systems. These clients are often businesses in various economic sectors. Unless there are clear and direct advantages for the client, there may be resistance to using such systems, thus diminishing the effectiveness thereof. Many studies were done considering the satisfaction of the individual. Relatively few studies were done concentrating specifically on business banking needs and satisfaction.

1.10 SUMMARISED CHAPTERS OVERVIEW

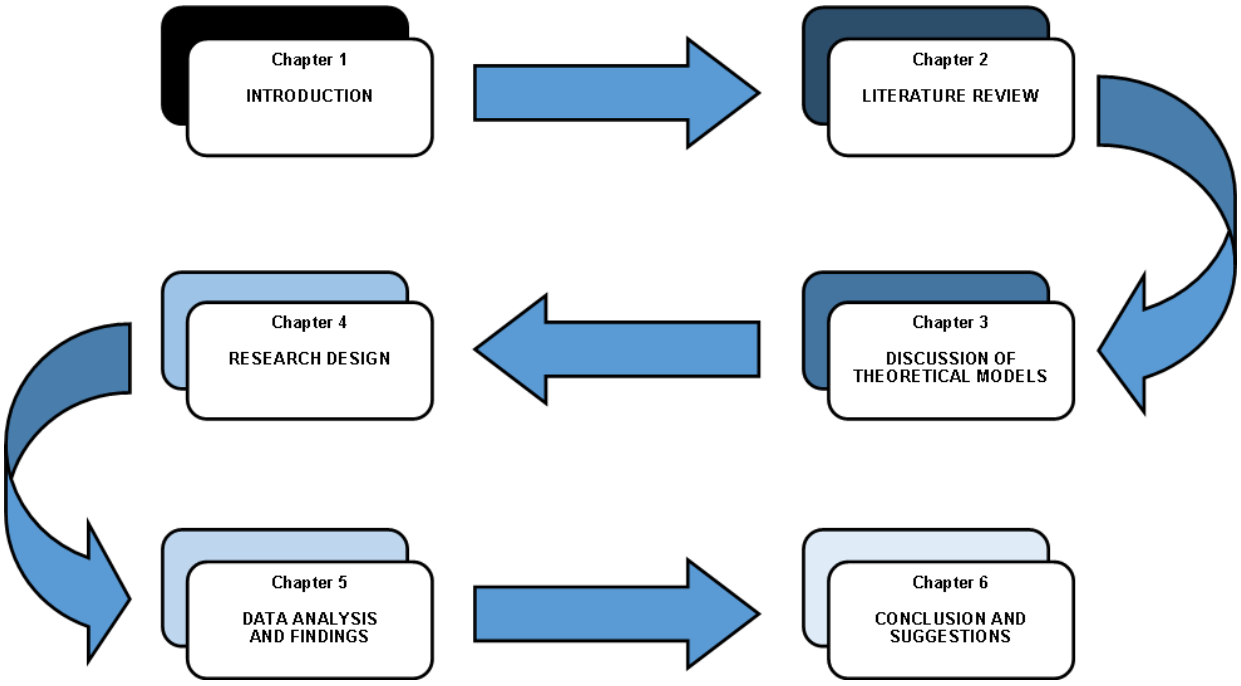

Figure 1 - Overview of chapters and contents

What?

Chapter 1 is setting the scene by describing the focus area of research, describing the research problem and stating the research questions. The contribution of this research is also described, as well as currently known limitations with the proposed study.

Why?

Chapter 2 is a review of the literature. This literature review aims to deepen the understanding of the origin of the current position, and to define the context within which the research is being conducted.

Chapter 3 extends the literature research done in Chapter 2 by considering different theoretical models to find a suitable method to use in this research. It further defines concepts, describes research previously conducted with the findings thereof, and focuses the proposed research.

How?

Chapter 4 describes the research method, ontology, the theoretical basis of the research and epistemology which is chosen for this research paper. The ethical foundation is also described, as well as the survey questions and a cover letter discussed.

Findings

Chapter 5 contains a systematic literature review, the detailed discussion and explanations of the research conducted and the findings thereof. A survey distributed is also processed and discussed, then compared to the findings of the systematic literature review and to an old research paper where system effectiveness was measured with an objective instrument. This instrument served as the original starting point to develop the instrument used in the survey used in this research paper.

Conclusion

Chapter 6 will summarise the findings, draw a conclusion and describe future recommendations for research.

2 LITERATURE REVIEW

2.1 INTRODUCTION

To conduct meaningful research on e-business, it is firstly necessary to understand what e-business is. It is also necessary to understand what research had previously been done, narrowed down to the subject which is chosen for further research. To this end, substantial research had been done in the past concerning business-to-business (B2B) and business-to-consumer (B2C) e-commerce systems as discussed below. It was also found that a clear differentiation has been made between e-commerce and e-business. E-commerce is mostly concerned with **trading** between commercial parties, be it individual or corporate, whereas e-business had been extended to include many other business functions that do not necessarily involve trading but include intra- and inter-company functions of source and supply of goods, information and services. These concepts are further explored in the following discussion.

2.2 BUSINESS-TO-BUSINESS E-COMMERCE (E-BUSINESS)

2.2.1 DEFINING E-BUSINESS

Several different definitions of e-business can be put forward. What does need to be clear is that e-business is not e-commerce. E-commerce is defined as being narrower in scope than e-business, and is often confined to selling and buying online (Chaffey, 2015). E-business was first coined by IBM in 1997 who described it as "*the process of extending or transforming the business processes by making use of internet technologies*". This definition by IBM seems to imply that all business processes are potential candidates for e-business extension or development in some way, or at least impacting thereon. By considering the extension of business processes, the coverage of e-business solutions is by default much broader and deeper than the solutions offered by e-commerce internet solutions.

2.2.2 POSITIONING E-BUSINESS IN THE GENERAL BUSINESS STRATEGY

Business strategy had been described and discussed in numerous publications and by many authors over many years (Porter, 1980, Pretorius and Maritz, 2010, Williams, 2007, Miles et al., 1978, Chetty, 2010, Ackoff, 1990). The most prolifically quoted and influential work seems to come from Michael Porter, who had written many works on business strategy formulation and execution. One of his most quoted seminal works is titled "Competitive Strategy" (Porter, 1980). It contains a description of the competitive forces driving industries,

namely suppliers, buyers, potential entrants, substitutes and industry competitors, depicted in Figure 2. Porter's strategy description had become a pillar in academic journals with competitive and corporate strategies. It has been quoted by several authors afterwards in an e-business or e-commerce context (Laudon and Laudon, 2011, Pavlou and El Sawy, 2006, Sabat, 2002). However, it remains to be seen if this framework can maintain its dominance in the internet economies, especially due to collapsing timeframe pressures to deliver increasingly complex solutions to markets, as well as the highly competitive pressures on a global scale.

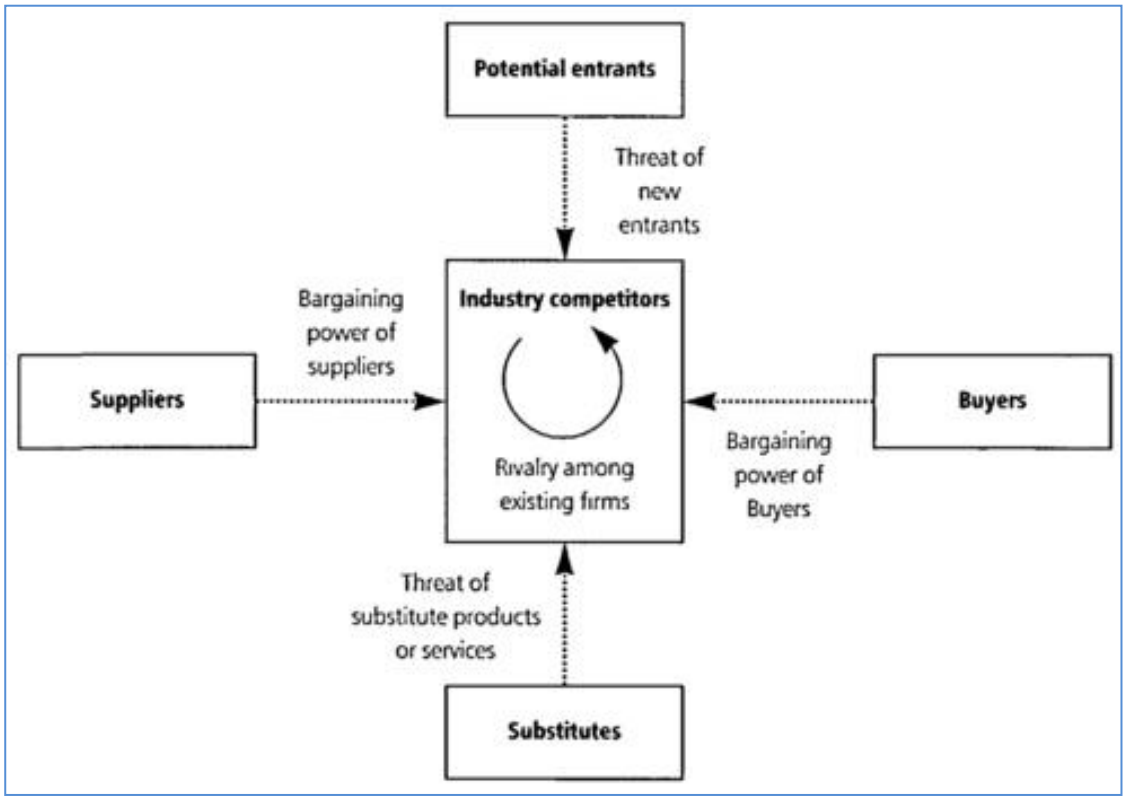

Figure 2 - Forces driving industry competition (Porter, 1980)

As early as in 1983 Pyburn (1983) already documented a process describing the linking of the MIS plan with corporate strategy. At that stage, corporate strategy formulation and execution was already well-established and widely practised. Pyburn (1983) documented three approaches to strategic MIS planning, displayed below in Figure 3. He also determined by way of interviews, several important contributing factors which impacted on the successful outcome of MIS to business strategy alignment. The most important factors are:

- The status of the IS Manager,
- The business' volatility,
- The degree of IS environment complexity,
- The personal styles of the IS manager, and
- The physical closeness or proximity of the IS managers to user management.

	Personal-Informal	Personal-Formal	Written-Formal
• Who is responsible for Planning?	The Senior IS Manager	The Senior IS Manager with assistance from the IS line managers	The MIS Planning Department
• How is Planning Accomplished?	Primarily through informal face-to-face discussions	Primarily through formal presentations, steering committee meetings, etc	Primarily through the interpretation of written business plans
• How is Top Management Involved?	In successful cases, top management is involved through ad hoc informal discussion. In less successful cases, the only involvement was at lower levels, if at all.	In successful cases, top management involved through a series of formal presentations (of development plans, budgets, "white papers", etc.). Two-way communication the result of presentation and discussion that follows.	In successful cases, top management is involved primarily to review and approve the written MIS plan.
• Importance of the Written IS Plan to Decision Making	Low	Moderate	High
• Integration of Planning with Other Management Systems (e.g. Budgeting, Performance Evaluation)	Low	Moderate	High
• Clarity of Business Objectives and Strategies to Senior IS Manager	Clear only when top managers talk frequently with the IS manager.	Fairly clear when top managers are regularly present at "meetings".	Very clear, to the extent that written business plans reflect true objectives and strategies.

Figure 3 - Approaches to strategic MIS planning (Pyburn, 1983)

Luftman, in a series of articles over several years, further described the process of aligning IS strategy to corporate or business strategy. The first work described a number of factors that either enabled or inhibited business and IT alignment (Luftman et al., 1999). In the same year he documented methods to achieve and sustain business and IT alignment (Luftman and Brier, 1999). These two works were followed up with the development of a methodology to measure the successes of IT to business alignment (Luftman, 2003, Luftman et al., 2010). This methodology is based upon the Capability Maturity Model (CMM). CMM is a set of guidelines based on best-practices which are aimed at delivering stable and repeatable software development projects (Bamberger, 1997). It was, over the years since its conception by the Carnegie-Mellon Institute, been adapted and used in

various applications and environments (Zhong et al., 2014, Reichner, 1996, Van Baaren et al., 2014, Tiku et al., 2007).

Although e-business profiles vary based on the strategic orientation of businesses, it was found by Raymond and Bergeron (2008) that e-business alignment to business strategy had positive performance outcomes for manufacturing businesses of small to medium size. These positive outcomes were in financial, growth and productivity performance, regardless of whether the businesses were defender, analyser or prospector strategic types. The strategic types defender, analyser and prospector was first described in detail by Miles (1978). The three strategic types are defined as follows:

Defender: An organisation which focuses on a small specialised niche market, limiting product offerings and keeping competition out with a mix of aggressive pricing, product quality and efficient production methods.

Prospector: An organisation which displays an ability to find and exploit new market or product opportunities. The Prospector organisation is typically highly innovative.

Analyser: An organisation that attempts to minimise risk while maximising profit.

Damanpour and Damanpour (2001) concluded five points which expresses both the urgency and concerns around e-business. These are:

- E-business is no longer an alternative, but essential,
- There is no standard model that fits all companies or industries,
- The major benefits are:
    - to gain competitive advantage,
    - increase efficiency,
    - integrate suppliers / vendors and clients,
    - improve distribution,
    - lower costs and
    - broaden market penetration
- At the time of this study, e-business was concentrated amongst wealthy nations with a lack of funds being the reason for the lack of e-business presence in developing and poorer nations,

- Internet security and vulnerability was a major concern.

Evans (2001) identified two major issues that require to be addressed sufficiently in order to implement a successful e-business migration, namely

1) that business processes need to be changed to become customer-centric,
2) the right technology must be acquired at the right time.

Both these issues have a profound impact on the business strategy which in turn impacts the IT strategy. Sharma and Gupta (2004) concur in their study with Evans (2001) in finding amongst other issues that the processes, people and systems must function in a closely integrated ("symbiotic") manner to meet and exceed expectations of stakeholders. They also state that customer-focused staff is required, with processes which are simple to execute, yet flexible enough to change with requirements.

2.2.3 AREAS OF E-BUSINESS APPLICATION

The use of e-business systems is already widely applied in various disciplines (Palmer, 2002). Examples are:

- e-learning (Muse, 2007, Foster and Lin, 2003),
- online ordering and purchasing of books (Amazon.com), electronic goods (Dell, Apple, takealot.com), groceries and clothing (inthebag.co.za, spree.co.za), digital entertainment including movies and music (Sony Professional Entertainment, iTunes),
- e-government services (Kerr and Bryant, 2008, Morgeson and Mithas, 2009, Rashid and Othman, 2017) at both local and central level. Such services include submission of tax returns, payment of utility bills and various regulatory submissions as may be required by governments. Lately applications for identity documents and passports are becoming increasingly electronic,
- banking (Levenstein, 2001, Sehgal, 2017, Rahi et al., 2017, Ozlen and Djedovic, 2017, Mou et al., 2017, Low et al., 2017, Sheikhi and Sheriff, 2016, Tat and Nor, 2015, Martins et al., 2014, Hanafizadeh et al., 2014, Ezzi, 2014) which had been at the forefront of e-business for some time,
- tourism, including accommodation reservation and travel bookings such as airline flight bookings (Wang and Cheung, 2004).

E-business functions are continuously extending into the delivery of information using the internet to remote clients, suppliers and staff who are not office-bound, including functions such as the capturing and tracking of supplier and customer orders, updating of personal information, delivery of management reports (Strydom, 2013, Kwak et al., 2012, Dixit and Prakash, 2011, Muse, 2007, Presley, 2006, Fynes and Marshall, 2005, Siau and Messersmith, 2003, Ash and Burn, 2003, Loos, 2000). New functionalities are discovered, designed and added daily.

2.2.4 E-BUSINESS IN THE BANKING SECTOR

One of the business sectors that rapidly embraced e-business is banking. With the large number of clients that banks normally need to deal with, as well as clients' need to perform certain functions and transactions "on the go", it is worthwhile for banks to invest substantial development into online, self-service applications and web sites for clients. Together with the adoption of these technologies followed the need to determine the value offered by these systems to clients. These research projects have been conducted for more than two decades now and yields varying results. It possibly depends on the state of technology at the time that the research is conducted. Searching for electronic banking (e-banking) systems in a variety of databases and document sources, one gets a rich set of results. This clearly has its own challenges when these research articles need to be read, understood and consumed. While some e-banking research is relatively old (Tan and Teo, 2000, Gerrard and Barton Cunningham, 2003, Akinci et al., 2004, Pikkarainen et al., 2004), there are already conference papers published this year, indicating that the popularity of the subject has not subsided (Ozlen and Djedovic, 2017, Low et al., 2017, Sheikhi and Sheriff, 2016).

Many international studies were concluded where the effectiveness of e-banking systems is attempted to be determined in several ways. It is also not always obvious, as the titles and contents do not necessarily contain the keyword "effectiveness", but is implied by measuring "adoption", "acceptance", etc. A rather large list of research works is quoted and is considered in Chapter 5 in detail (AbuShanab et al., 2010, Akinci et al., 2004, Al-Qeisi, 2009, Amin, 2009, Ayo et al., 2010, Cheng et al., 2006, Eriksson et al., 2008, Ezzi, 2014, Gerrard and Barton Cunningham, 2003, Gikandi and Bloor, 2010, Hanafizadeh et al., 2014, Lee, 2009, Linstone and Turoff, 1975, Loonam and O'loughlin, 2008, Martins et al., 2014, Naimi Baraghani, 2008, Pikkarainen et al., 2004, Polasik and Piotr Wisniewski, 2009, Shon and

Swatman, 1998, Tan et al., 2010, Tan and Teo, 2000, Tat and Nor, 2015, Xue et al., 2011, Yu, 2012).

Research done where South Africa is specifically targeted or included as a geographical area is available. A number of articles where the current state of online electronic banking systems is the subject is considered later in this research paper (Sabharwal, 2016, Mujinga et al., 2016, Maduku, 2013, Masocha et al., 2011, Porteous, 2006).

2.2.5 BENEFITS OF E-BUSINESS

Soliman and Youssef (2003) found the list below to be the most considered benefits to be achieved using e-business systems.

- Cost reduction
- Simplification of processes
- Customer service improvement
- Generation of new income streams
- Quicker decision-making cycle

Other, but similar findings were reported by Beheshti and Salegi-sangari (2007) as listed below:

- Reduced unit cost of goods and services - less staff needed
- Efficiency improvement
- Improved operational flexibility
- Improved responsiveness to client and supplier needs
- Data collection which allows improved marketing strategies, higher sales and better customer service

Youlong and Lederer (2003) devised an instrument consisting of 27 items which measure five distinctly identifiable factors, namely back-end efficiency, market expansion, inventory management, cost reduction and customer service levels. It provides a common measure for independent and dependent variables, aimed at making it easier for practitioners to make decisions around business-to-consumer (B2C) e-commerce solutions. Like many others, this study pivots around the supplier of the e-commerce service with an almost total

exclusion of the customer and the possible benefits to be derived by the customer through the use of a supplier's e-business systems.

Sanders (2007) concentrated his study on using e-business integration between suppliers and manufacturers. Although he found that suppliers, by virtue of being financially smaller, thus limited in ability compared to the larger manufacturing businesses, stood to gain substantially in several integration points.

From the above publications one can summarise the main areas of benefit which includes:

- Efficiency gain,
- Possible cost reductions,
- Improved communications internally and externally,
- Improved customer service,
- Increased flexibility, and
- Quicker decision-making cycles.

Several academic studies on e-business systems concentrated on e-banking, a specific and focussed type of e-business system (AbuShanab et al., 2010, Amin, 2009, Hanafizadeh et al., 2014, Lee, 2009, Martins et al., 2014, Pikkarainen et al., 2004, Tan et al., 2010, Xue et al., 2011). The contents of these articles are discussed in Chapter 5 in more detail.

2.3 NOTES ON EFFECTIVENESS

2.3.1 DEFINING EFFECTIVENESS

There seems to be a wide array of definitions in many publications as to what "effectiveness" encapsulates. The standard dictionary definitions below seem to all imply that a specific result must have been achieved successfully. The difficulty lies in how “successful” is defined and measured. There seems to be no consensus on this matter.

- Effectiveness is defined in the Oxford dictionary (2017) as:

  "The degree to which something is successful in producing a desired result."

- According to the Cambridge online dictionary (2017) effectiveness is described as:

  "successful or achieving the results that you want"

- The business dictionary website (2017) describes effectiveness as:

> *"The degrees to which objectives are achieved and the extent to which targeted problems are solved. In contrast to efficiency, effectiveness is determined without reference to costs and, whereas efficiency means 'doing the thing right', effectiveness means 'doing the right thing.'"*

For this study, the third definition as described by the business dictionary website above will be used as defining more precisely the outcome which needs to be achieved. As in described in detail in Chapter 4, the difference in scoring between **Importance** and **Actual** ratings reported by clients will determine the degree to which a set of factors are effective in addressing a business requirement (problem).

2.3.2 CRITICISM ABOUT EFFECTIVENESS

In a number of seminal works in which Cameron contributed substantially (Cameron, 1978, Cameron, 2010, Cameron, 1986, Quinn and Cameron, 1983), the difficulties and obstacles in defining effectiveness is discussed in-depth. In the first of these works (Cameron, 1978) these difficulties are described. Cameron grouped these difficulties into two major groups, namely the type of criteria used to measure effectiveness and the sources of the criteria. Cameron then further elaborated into these two groups. The type of criteria used to measure effectiveness was described at the hand of four aspects that influence the measuring. The four aspects are:

i. The culture of the organisation,
ii. If the criteria are universal or specific,
iii. Whether the criteria are normative or descriptive in nature, and
iv. If the criteria quality is static or dynamic.

As for the sources of criteria Cameron stated three aspects that need to be considered. These are:

i. The groups of influencers which Cameron describes as "constituencies",
ii. The level of analysis conducted,
iii. The objectivity of using organisational records in contrast to the subjectivity of perceptions.

In most instances, the degree of success is a subjective judgement. However, many academic research studies, definitions and theories were developed, culminating in methodologies that allow some degree of defined measurement to determine if a system or solution is indeed effective (Hinton and Barnes, 2009, Newkirk and Lederer, 2006, Wu and Chen, 2006, Ha and Forgionne, 2006, Liebmann, 2001).

The typical research study concentrates on measuring or determining effectiveness **within** an organisation, typically this is the organisation that created, or advocates use of the specific solution. By volume, few studies involve the measure or determination of effectiveness of solutions that apply beyond the boundaries of the originating organisation, in other words e-business systems.

2.3.3 MEASURING THE EFFECTIVENESS OF COMPUTER SYSTEMS

One of the very significant works to measure the effectiveness of information systems was conducted and published in South Africa by Miller and Doyle (1987) in which they studied the effectiveness of computer systems in the financial services sector. This work is quoted by several international researchers since 1987 (DeLone and McLean, 1992, Seddon and Kiew, 1996, Shih, 2004a, Nelson et al., 2005). Additional research was published by Miller to measure the systems effectiveness in different industry sectors (Miller, 1987, Miller, 1993). These studies were based on a statistical instrument consisting of 38 attributes of information systems, designed to measure the perceptions in six major dimensions of information systems' activities being:

- Type 1 Information Work,
- Type 2 Information Work,
- IS Staff Characteristics,
- IS Strategic Issues,
- User Participation,
- IS Responsiveness to Changing User Needs.

Type 1 and type 2 information work is sub-categorised as follows. Type 1 information work includes measurement of accuracy, currency, completeness, user confidence, relevance, timeliness, cost-effectiveness, reliability, availability and security. It thus measures the operational attributes of information systems. Type 2 information work is concerned with

the availability and usefulness of decision-support data analysis capability and modelling ability to analyse and evaluate business alternatives. This measures the strategic support of the information systems for management. It can also be categorised as Type 1 information work describing low-cost, high volume data related transactions, while Type 2 information work defines high-cost, low volume data related transactions aimed more towards managers and other higher level analytical professionals.

2.3.4 MEASURING THE EFFECTIVENESS OF E-BUSINESS

Liebman (2001) states that the end-user moved from the traditional internal staff to include the external customer. His article extends to a particularly technical level of monitoring functions and facilities for being active, responsive and accurate to retain the goodwill of the customer visiting the e-business site. He contends that it is necessary to consider automated monitoring tools to support this function.

A comprehensive and complex Decision Making Support System (DMSS) was developed in order to predict e-business success using simulation modelling (Ha and Forgionne, 2006). In the discussion and conclusion, the authors clearly find that the DMSS and eventual model is determined by the actual problem under investigation and not the other way around. Several limitations were encountered which affected the outcome of the study and simulation. The conclusion is that for a company to gain competitive advantage in e-business, the e-business strategy needs to be established effectively and timely. They admit that substantial validation and expansion is required in the developed software before it can make a significant contribution to developing and supporting the e-business strategies of organisations.

Mahmood et al (2008) describe the evidence of the benefits of e-commerce as "*anecdotal*" with "*little*" empirical evidence to support the perceived evidence of e-commerce ventures. By using diffusion theory to analyse the use of e-commerce, they attempt to create an exploratory model grounded in IT business value and productivity literature.

Hinton and Barnes (2009) set out to determine effective performance measurement criteria for e-business. They determined four wider areas of performance which needs consideration, being:

- Performance of the web site,

- Performance of the business processes,
- Performance of the customers, and
- Linking of the e-business performance to the general business strategy.

The researchers proceeded to establish a set of organisations within which case studies were conducted to determine performance measurement criteria common to these. Twelve organisations were identified and engaged for this study, representing a spread of industry segments and services, from healthcare through port management, legal services and trade union activities. They concluded that most companies have a tentative and experimental approach to measuring the performance and effectiveness of their e-business solutions, with little evidence to prove an underlying framework or methodology of measurement.

2.3.5 MEASURING THE EFFECTIVENESS OF E-BANKING SYSTEMS

There were several studies found which were conducted and published over a period of more than twenty years. These studies are focussing on the externally facing electronic banking systems (e-banking). Not all these solutions were necessarily internet based. It also seems that there is no clear delineation between retail, wholesale and business clients in these studies. Retail are the normal, single person who owns and uses a bank account to conduct financial transactions on a regular basis through it. The monetary value of these are typically low in comparison to that of business and wholesale banking clients. Business clients are normally not necessarily a person, but is rather a legal entity, using a banking system to conduct financial transactions focussed towards conducting the day-to-day business requirements. These transactions are typically of a much higher monetary value than those conducted by retail clients, and there may be hundreds, if not thousands of transactions per day. Wholesale clients are normally the clients who conduct transactions with very high monetary values, e.g. bank branches and cash processing centres. Selected research articles are listed in Table 28 in Appendix C. These are further discussed, analysed and summarised in Chapter 5.

2.4 SUMMARY AND CONCLUSION

From the foregoing analysis of available research conducted which includes measurement paradigms and models, it becomes clear that there seems much disparity and inconsistency in determining the effectiveness of e-business solutions. Valuable work has been done in measuring the effectiveness of internal information systems within the traditional boundaries

of organisations, such as the early work done by Miller (Miller, 1987). These works still need to be extended to include the testing of e-business systems' effectiveness and performance against the perceptions of external business partners, which include clients, suppliers and other external stakeholders. It is planned that this research will extend into the realms of the customer's benefits realisation, proving that past measurement research done and the underlying methodologies and models, can be extended and applied outside the self-imposed boundaries of the organisation whose e-business systems are being measured. Chapter 4 expands from the literature studied here to form a research approach, hypotheses and to describe the paradigm followed.

3 DISCUSSION OF THEORETICAL MODELS

3.1 OVERVIEW OF MODELS

It stands to reason that it will be difficult to consider and describe the host of theoretical models in this paper. There are literally hundreds, if not thousands of theoretical models. A list of 103 theories is published as had been used in Information Systems studies alone (Larsen et al., 2015). To remain relevant and limit the volume of this paper, only the theories encountered in the articles researched are considered in this chapter.

In some cases, is should be noted that research was not always conducted with a specific theoretical model in mind. This is particularly true of research done in Information Systems during the 1970 to 1990 period. There were occasionally research methods used and applied from other research disciplines. It also seems to depend to an extent on whether the research was positivist or otherwise.

3.1.1 TECHNOLOGY ACCEPTANCE MODEL (TAM)

According to Legris et al (2003), one of the most used theories in IT research is the Technology Acceptance Model (TAM), which is derived from the original Theory of Reasoned Action (TRA). The TAM theoretical model is displayed in Figure 4. This model was initially defined by Davis (1989).

It is based on the psychological perceptions of users regarding the usefulness (PU) and ease of use (PEOU) of a system. A positive outcome in PU and PEOU tends to lead to positive outcomes in the attitude (AT) towards a system, and the behavioural intention (BI) to use the system. Based on the simplicity and ease of applying in a research setting, it is often favoured by researchers.

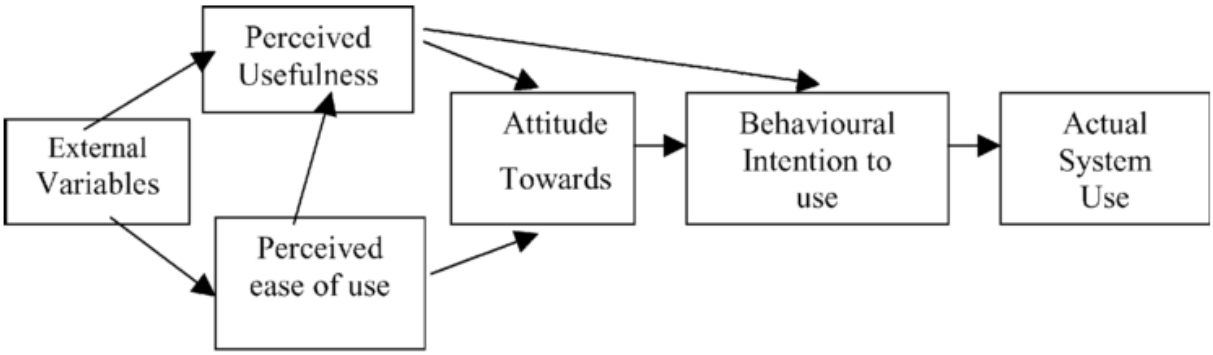

Figure 4 - Original Technology Acceptance Model (Legris et al., 2003)

Shih extended the TAM model to conduct research on the prediction of user acceptance of e-shopping on the Web (Shih, 2004a) as well as studying the internet utilisation behaviour of internet users (Shih, 2004b). Figures 5 and 6 depict the adapted TAM models as proposed by Shih.

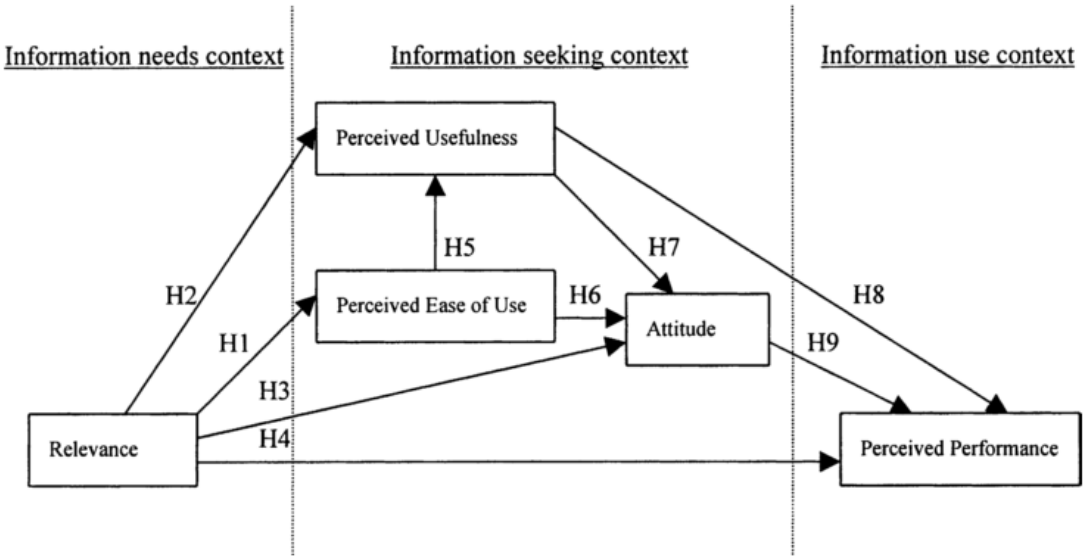

Figure 5 - Extended TAM research model (Shih, 2004b)

Figure 5 was used by Shih (2004b) to study internet utilisation behaviour. The standard TAM model was extended to consider the relevance of the information within the context of the internet usage. From it Shih defined four hypotheses (H1 to H4). These hypotheses are:

> H1. Relevance of information needs is positively related to user perceived ease of use of the Internet.

H2. Relevance of information needs is positively related to user perceived usefulness of the Internet.
H3. Relevance of information needs is positively related to user attitudes toward using the Internet.
H4. Relevance of information needs is positively related to user perceived performance of the Internet.

The research result showed that relevance was a strong determinant for perceived usefulness, perceived ease of use, attitude and perceived performance.

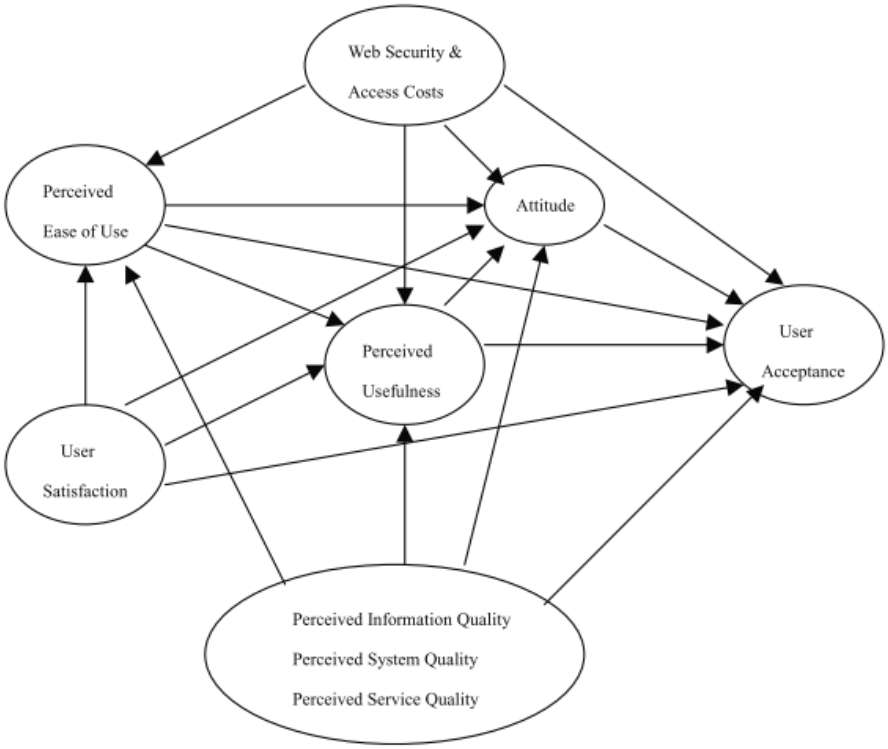

Figure 6 - Extended TAM (Shih, 2004a)

Shih extended the TAM model again in 2004 (Figure 6) when he conducted research into predicting user acceptance of e-shopping using the web as the medium (2004a). In this research he used work done by Davis (1993) to include web environmental factors for quality, security and access cost. Shih defined many hypotheses which tested both the Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). PEOU was further subdivided into Perceived Ease of Use of the Internet / Web (PEOUW) and Perceived Ease of Use of Trading online (PEOUT).

Another extension of the traditional TAM was performed by Mathieson (2001) with the introduction of a construct which he named "Perceived Resources" (PR) presented in Figure 7. This measures the extent to which an end-user believes they have access to the required resources to use an information system.

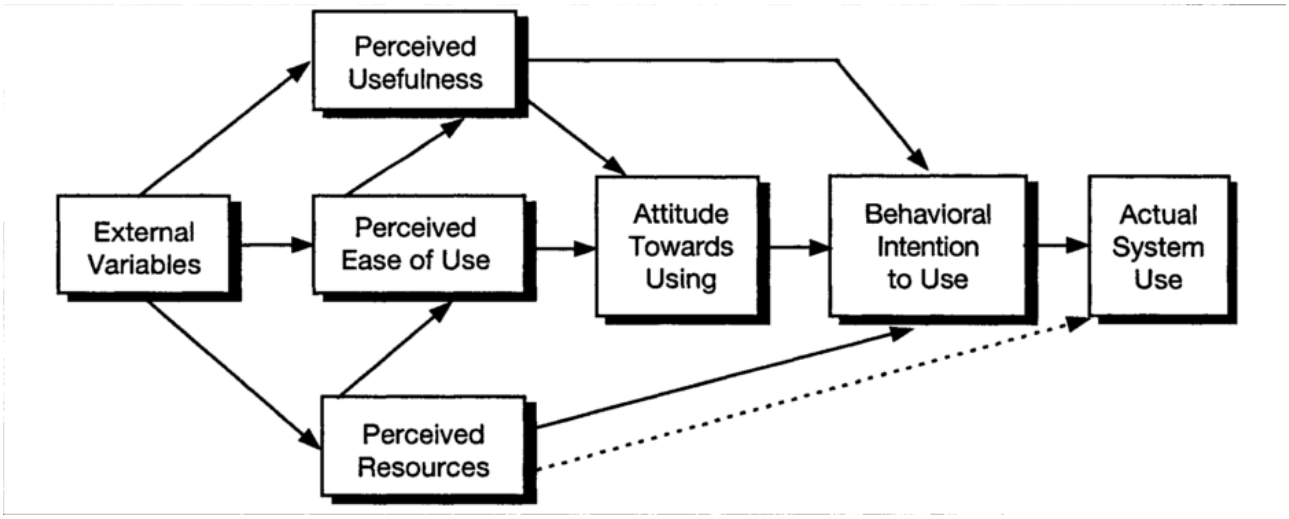

Figure 7 - Extended Technology Acceptance Model (Mathieson et al., 2001)

Mathieson's (2001) argument is that by isolating Perceived Resources (PR), researchers have some insight into factors over which users have a degree of control. The research by Mathieson showed that where a user perceived sufficient resources available, the outcome of the model did not change from the standard TAM PU and PEOU outcomes. However, where a user had doubts with regards to the sufficient availability of several resources needed to use a system, the correlation between PR and Behavioural Intention to Use (BI) was very strong. PR did not influence Actual System Use (SU) in Mathieson's extended TAM model since the required resources are already in place with the system being in use.

The above descriptions of the adaptations to the TAM theory by Shih and Mathieson, displays the way it can be used and the ease of extending the model to conduct research. This is especially valuable where the effectiveness or usefulness of information systems, of which e-business systems forms a specific category, can be studied and documented.

Of the articles researched, the following articles are some using TAM or adaptations thereof as the theoretical model of choice:

- An analysis of online banking usage intentions: An extension of the Technology Acceptance Model (Amin, 2009)
- The state of e-banking implementation in Nigeria: A post-consolidation review (Ayo et al., 2010)
- Adoption of internet banking: an empirical study in Hong Kong (Cheng et al., 2006)
- Users' Loyalty towards Mobile Banking in Malaysia (Low et al., 2017)

3.1.1.1 TAM2

In 2000, Venkatesh and Davis (Venkatesh and Davis, 2000) published a revision to TAM called TAM2. This extension is visualised below in Figure 8. The revised TAM model included two additional constructs being social influence processes and cognitive instrumental processes. The social influence processes contain constructs such as "subjective norm", "voluntariness" and "image". Cognitive instrumental processes contain the constructs "job relevance", "output quality", "result demonstrability" and "perceived ease of use". The authors then explained the purpose and content of each of these constructs. The definitions are summarised below.

Table 7 - Determinants of Perceived Usefulness (Venkatesh and Bala, 2008)

Determinants	Definitions
Perceived Ease of Use	The degree to which a person believes that using an IT will be free of effort (Davis, 1989).
Subjective Norm	The degree to which an individual perceives that most people who are important to him think he should or should not use the system (Fishbein & Ajzen, 1975, Venkatesh & Davis, 2000).
Image	The degree to which an individual perceives that use of an innovation will enhance his or her status in his or her social system (Moore & Benbasat, 1991).
Job Relevance	The degree to which an individual believes that the target system is applicable to his or her job (Venkatesh & Davis, 2000).
Output Quality	The degree to which an individual believes that the system performs his or her job tasks well (Venkatesh & Davis, 2000).
Result Demonstrability	The degree to which an individual believes that the results of using a system are tangible, observable, and communicable (Moore & Benbasat, 1991).

Research was done at four organisations with a sample size of 156. The responses were requested at three points in the system life-cycle namely, pre-implementation, at a month post-implementation and at three months post-implementation. Two organisations were selected where the system usage was voluntary, and two where the system use was mandatory. Their findings concluded that both processes significantly influenced user acceptance.

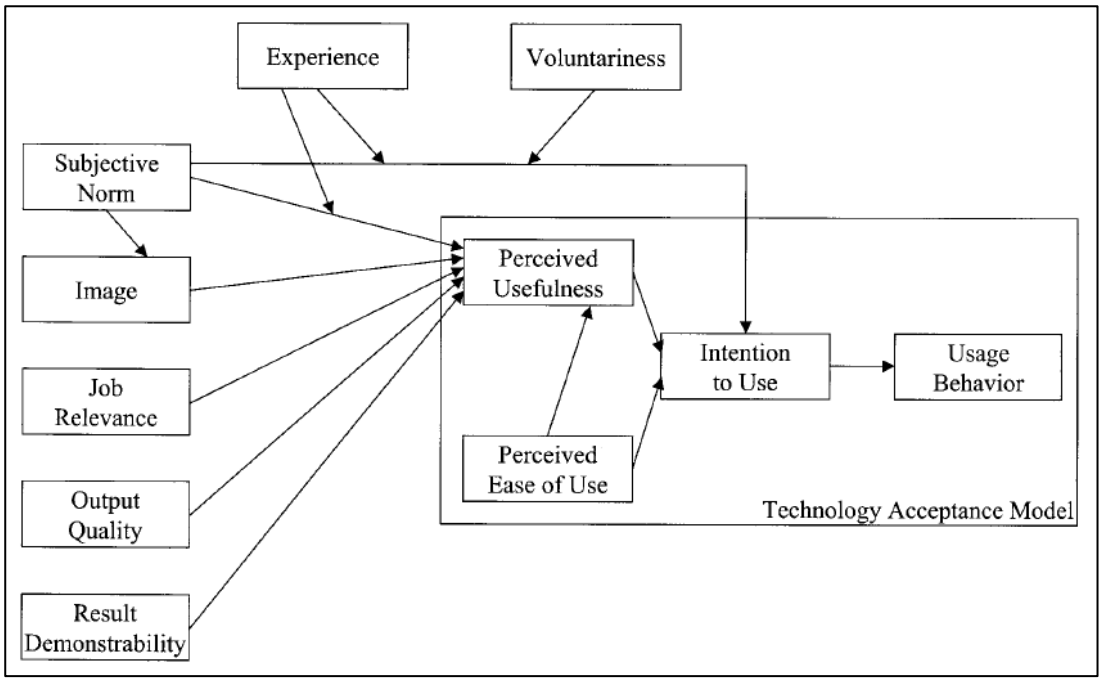

Figure 8 - Proposed TAM 2 - Extension of the Technology Acceptance Model (Venkatesh and Davis, 2000)

3.1.1.2 TAM3

Another revision was published by Venkatesh and Bala (2008) called TAM3. Figure 9 depicts the extended model with the original TAM model contained within the broken line frame, and the extensions to the model depicted as constructs outside the frame, influencing the constructs inside the frame. Six further determinants of Perceived Ease of Use were defined. These are listed with their definitions as documented by Venkatesh and Bala in Table 8.

Table 8 - Determinants of perceived ease of use (Venkatesh and Bala, 2008).

Determinants	Definitions
Computer Self-efficacy	The degree to which an individual believes that he or she has the ability to perform a specific task /

Determinants	Definitions
	job using the computer (Compeau and Higgins, 1995).
Perception of external control	The degree to which an individual believes that organisational and technical resources exist to support the use of the system (Venkatesh et al., 2003).
Computer Anxiety	The degree of "an individual's apprehension, or even fear, when she / he is faced with the possibility of using computers (Venkatesh, 2000).
Computer Playfulness	"…the degree of cognitive spontaneity in microcomputer interactions" (Webster and Martocchio, 1992).
Perceived Enjoyment	The extent to which "the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Venkatesh, 2000).
Objective Usability	A "comparison of systems based on the actual level (rather than perceptions) of effort required to completing specific tasks" (Venkatesh, 2000).

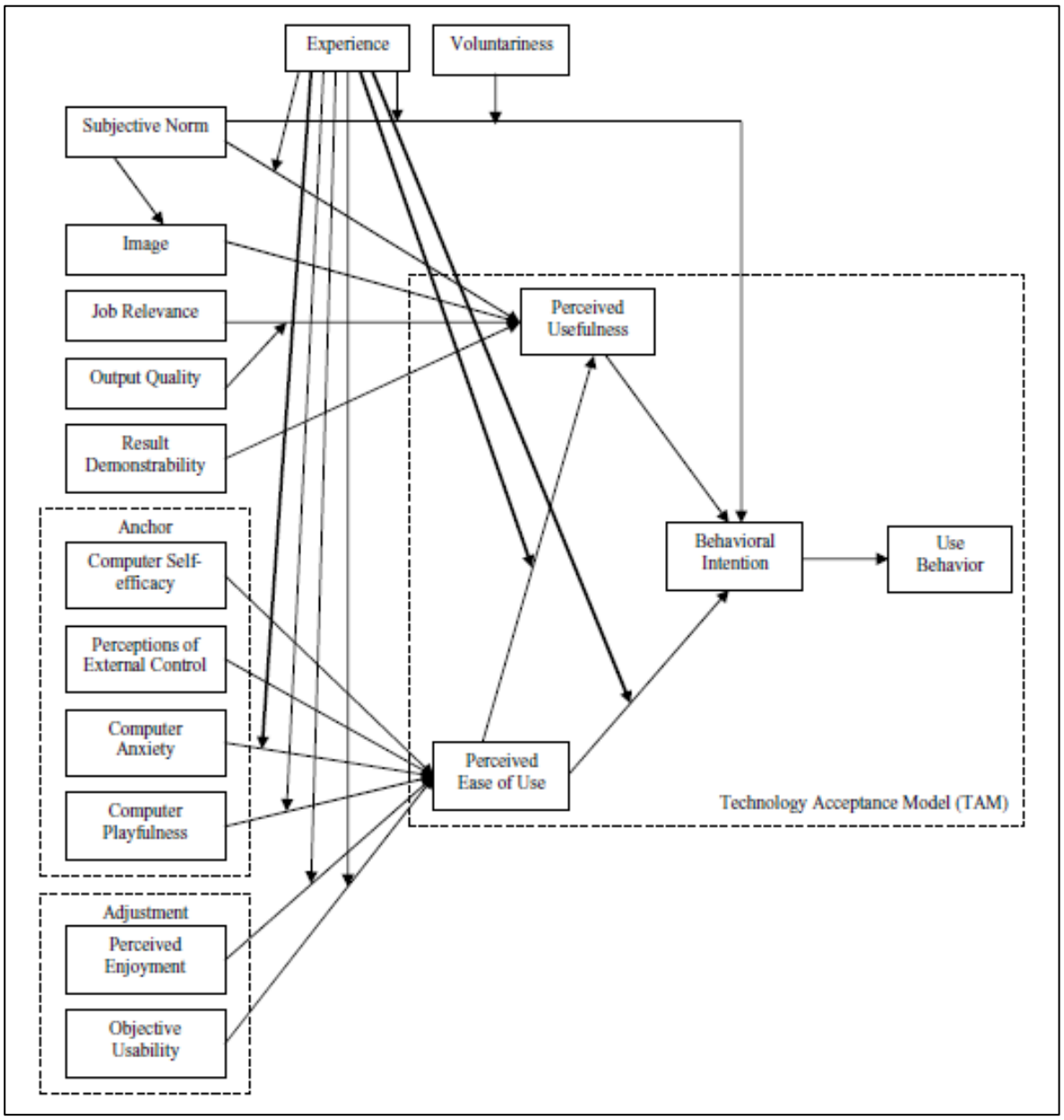

Figure 9 - Technology Acceptance Model 3 (Venkatesh and Bala, 2008)

3.1.1.3 CRITICISM OF THE TECHNOLOGY ACCEPTANCE MODEL

Several shortcomings were documented by authors regarding the Technology Acceptance Model and are listed and discussed below. Chuttur (2009) summarised many of these criticisms as follows:

- Limitations in the methodology used for testing the TAM model.

- Self-reported use data instead of real use data for measuring actual system use,

- Several studies commission students as participants in a controlled environment. Students are motivated by other factors to real-life motivations, thus the results cannot be generalised to the real world,
- Most TAM studies consider *voluntary* use of systems. Most organisations do not offer the users an alternative but to use the systems prescribed.

- Limitations in the variables and relationships present within the TAM model.

- Perceived Ease Of Use seems to become more important than Perceived Usefulness in settings where the use of a particular system is mandatory (Brown et al., 2002).
- Burton-Jones and Hubona (2006) found that some external factors like system experience, age and education level may have a direct influence on system usage.

- Limitations in the theoretical foundation of the TAM model.

  It is argued that TAM being presented as a deterministic model assuming that intention to behave in a specific manner will lead to such behaviour. Bagozzi postulates that an individual may change his or her mind considering other factors not included in the model and may take a different course altogether (Bagozzi, 2007).

3.1.2 THEORY OF PLANNED BEHAVIOUR (TPB)

The Theory of Planned Behaviour was described in 1985 by Ajzen (1985) as an extension of Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1977). TPB has been the dominant theoretical model used in human behaviour research for more than thirty years. A revision of TRA became necessary due to limitations experienced in the original model. The underlying principal of TPB is that intention leads to behaviour. The stronger the intention, the more likely that the subject will behave in a predictable manner.

The list of articles in Appendix C, Table 28, includes the following research using TPB as the underlying theoretical model:

- Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit (Lee, 2009)
- Factors influencing the adoption of internet banking (Naimi Baraghani, 2008)

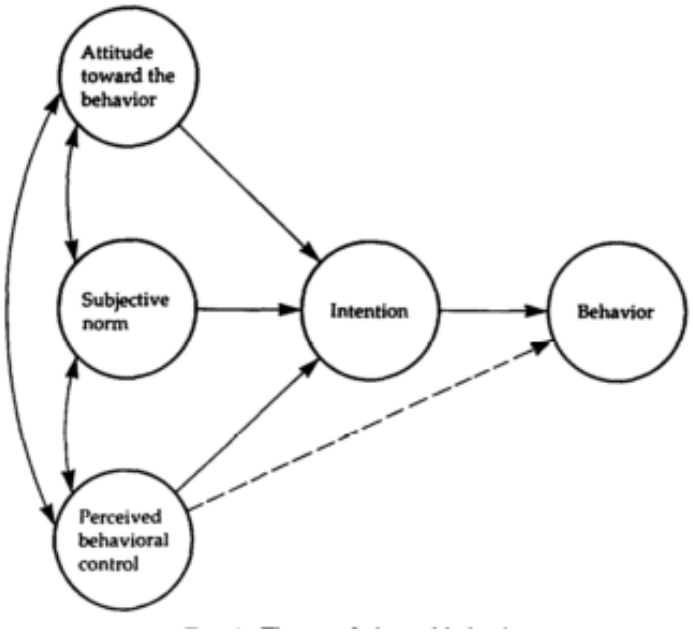

Figure 10 - Theory of Planned Behaviour (Ajzen, 2011)

3.1.2.1 CRITICISM OF THE THEORY OF PLANNED BEHAVIOUR

In a discussion document, Sniehotta et al (2014) listed many objections and criticisms against TPB. They suggested that, although many of the criticisms are in fact relevant, the debates on TPB should concentrate on two aspects of the model, namely:

- Concerns about validity

  Sniehotta et al (2014) argued that TPB does not sufficiently explain variability in the behaviour of individuals. They went further by stating that some of the theory's propositions are patently false.

- Concerns about utility

  In this second aspect of concern, the argument is raised that the TPB does not help practitioners to create or design useful interventions to human behaviour. It also does not lend itself to experimental testing. The main point raised is that TPB fails in the primary function of a theory, namely, not accurately communicating empirical evidence.

3.1.3 UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY

The Unified Theory of Acceptance and Use of Technology (UTAUT) was first described by Venkatesh et al (2003). UTAUT quickly found favour amongst researchers of Information Technology topics. The conceptual diagram is depicted in Figure 11.

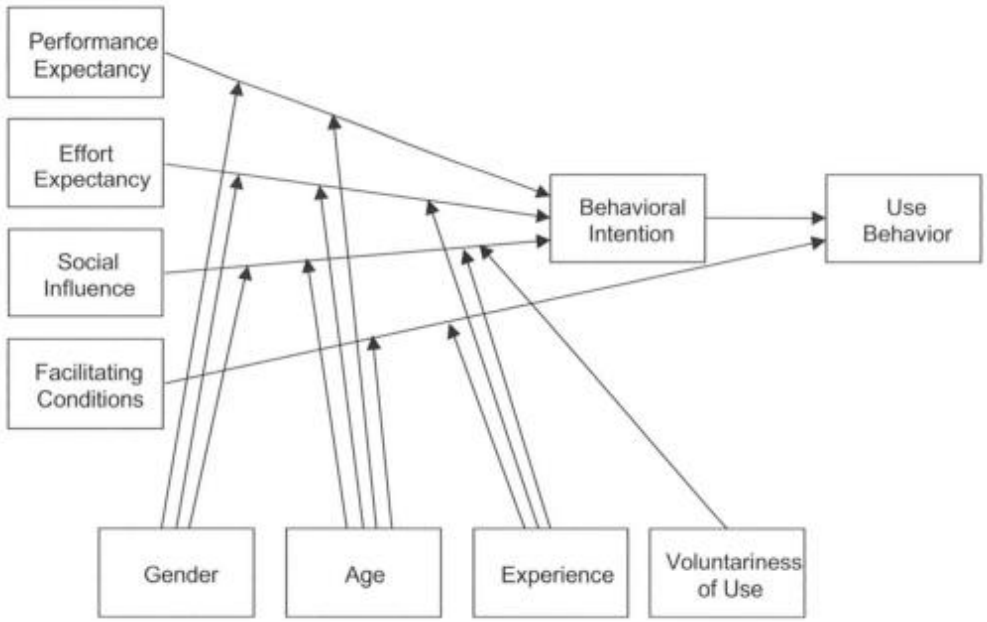

Figure 11 - Diagram of UTAUT theory (Venkatesh et al., 2003)

The origin of UTAUT came from the study and review of eight theoretical models, being the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Keller's Motivational Model, the Theory of Planned Behaviour (TPB), a combination of TAM and TPB, the Model of PC Utilisation (MPCU), Innovation Diffusion Theory and Social Cognitive Theory. Elements from across these eight theoretical models were integrated into the UTAUT model after obtaining data from four organisations over a six-month period and applied to the eight models. After design of UTAUT, the same data was applied to the new model which demonstrated the ability of UTAUT to outperform the eight individual models in predicting intention and usage.

Of the research articles studied for this paper, the research articles after 2000 seem to favour using UTAUT as the model of choice. The articles are quoted below.

- Internet banking and customers' acceptance in Jordan: the unified model's perspective (AbuShanab et al., 2010)

- Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application (Martins et al., 2014)
- Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model (Yu, 2012)
- Measuring the role of website design, assurance, customer service and brand image towards customer loyalty and intention to adopt internet banking (Rahi et al., 2017)
- Online banking acceptance: The influence of perceived system security on perceived system quality (Ozlen and Djedovic, 2017)

3.1.3.1 CRITICISMS AGAINST UTAUT

One of the most published and cited authors, Bagozzi (2007) noted that UTAUT is presented as a model meaning well and being thoughtful. However, it contains “at least” 41 independent variables to predict intention to use and a further eight independent variables to predict behaviour. He states that these models are increasingly becoming a complex quilt of piecemeal variables added without due consideration of the impact of these variables upon one another. Bagozzi (2007)further states that there may be other variables which were not tested by Venkatesh et al. (2003) which may also be credible. He concludes his critique by stating five points where the TAM, TPB, TRA and UTUAT methodologies fail on, namely:

- He identified two critical gaps in the theories: firstly, the intention-behaviour linkage and secondly, the linkage between individual reactions to using systems.
- The absence of a solid theory and method to identify the determinants of perception.
- The group, social and cultural aspects are not considered in the model.
- The notions of affect and emotions are over-simplified.
- No consideration of self-regulating processes in the deterministic framework.

3.1.4 OTHER METHODOLOGIES USED

3.1.4.1 RANDOM UTILITY MODELS

Random Utility Models (RUM) were developed from probabilistic choice models. It was developed by psychologists characterise inconsistencies observed in human behaviour (Manski, 1977). McFadden embraced these models in the late 1960’s, and used then in

econometric representations. His development work continued over several decades (McFadden, 1980).

It is not a methodology or model used often in information systems research. Of the articles studied, one was found to use the RUM model (Xue et al., 2011).

3.1.4.2 DELPHI

Delphi started off for military use in the 1950's (Project Delphi), to obtain the input from experts on particular subjects. This research technique was documented by Linstone et al. in 1972, and subsequently revised by the same authors in 2002 (Linstone and Turoff, 2002). Delphi is a forecasting method which utilises questionnaires sent out to a panel of experts at separate intervals. The results are aggregated anonymously and shared with a group.

One of the research articles studied, used Delphi as the underlying methodology, namely **Identifying effectiveness criteria for Internet payment systems** (Shon and Swatman, 1998). The study was done in Australia using 19 experts, conducting two rounds of questionnaires to determine a clear and concise set of effectiveness indicators.

The strengths, weaknesses or critiques on Delphi were not explored as it seems not to be used often for Information Systems research.

3.1.4.3 INNOVATION ADOPTION THEORY

This theory is not used frequently with Information Systems research, when compared to the well-known theories such as TAM and UTAUT. Described by Rogers and Shoemaker (1983) originally, Rogers published several revisions. The fifth edition was published (2003) describing many clarifications, extensions and in particular, the application of the theory in multiple disciplines. The key concepts are reflected in Table 9. The innovation Adoption Theory is primarily concerned with the dissemination and diffusion of innovations in social groups. It was borne by the fact that it often takes extra-ordinarily long to introduce new innovations into the mainstream. The theory describes characteristics which need to be considered, as well phases which innovations pass through during adoption. By being aware of these and actively planning and executing the requirements, an innovation can be disseminated much more rapidly than what is customary.

Table 9 - Key Concepts and Stages of Diffusion (Rogers, 2003).

Concept	Definition
Diffusion	The overall spread of an innovation, the process by which an innovation is communicated through certain channels over time among the members of a social system.
Dissemination	The planned, systematic efforts designed to make a program or innovation more widely available. Diffusion is the direct or indirect outcome of those efforts.
Innovation	An idea, practice or object perceived as new by an individual or other unit of adoption.
Communication Channels	Means by which messages are spread, including mass media, interpersonal channels, and electronic communications.
Social System	Set of interrelated units engaged in joint problem solving to accomplish a common goal. Social systems have structure, including norms and leadership.
Innovation Development	All the decisions and activities (and their impacts) that occur from an early stage to its development and production.
Adoption	Uptake of the program or innovation by the target audience.
Implementation	The active, planned efforts to implement an innovation within a defined setting.
Maintenance	The ongoing use of an innovation over time.
Sustainability	The degree to which an innovation or program of change is continued after initial resources are expended.
Institutionalisation	Incorporation of the program into the routines of an organisation or broader policy and legislation.

3.2 CONCLUSION

The theoretical models which were used in a set of chosen articles were described, noting the criticisms of each. Chapter 4 describes the selection of TAM as the most used and easily adaptable theory of choice, changing the basic model to accommodate external factors to be measured.

4 RESEARCH CONSIDERATIONS AND STRUCTURE

4.1 BACKGROUND

In Chapter three, the various theoretical methodologies encountered in the literature reviewed, was described, together with criticisms of the mostly used methodologies. In this chapter, the various research considerations are covered. Each concept is described shortly, and the selected concept is described. The reasons for choosing specific approaches, theories and paradigms is also stated in the descriptions.

4.2 OVERVIEW OF RESEARCH PARADIGMS

4.2.1 INTERPRETIVISM

More recently the **interpretive** approach seems to gain in favour (Myers, 2009). The outcomes are based on the interpretation of respondents in their respective environments and based on their personal perceptions of the concepts studied in each environment. They attempt to understand phenomena through the meanings that people assign to them.

4.2.2 POSITIVISM

With **positivism**, objective numbers are studied, whether these numbers are measurable properties, e.g. counts, values, ordinal values, etc. This approach normally starts with a theory, and then attempts to prove the theory.

4.2.3 CRITICAL RESEARCH

Critical research studies the social interaction, identifying patterns of power and control in a social setting. This study is not a social interaction study, but indicative of the perceptions of a community of users of a specific class of systems (e-business systems), and how these perceptions impact the attitudes and behaviour of the users of this class of systems.

4.2.4 INDUCTIVE VERSUS DEDUCTIVE REASONING

It is also necessary to differentiate between **inductive** and **deductive** reasoning. **Inductive** reasoning is where the researcher starts from the “bottom up”, analysing and studying the data collected, recognises patterns and trends, then formulates theories based on the findings. **Deductive** reasoning, closely related to the positivist approach, is the process where the researcher works from the “top down” by stating a problem, starts with a theory, forms one or more hypotheses, then conducts the research to either prove or disprove the theory and one or more hypotheses.

4.2.5 PREFERRED PARADIGM

This research study will use the **positivist** approach as the underlying paradigm during the research design and execution. Since this research starts with a problem, not knowing the effectiveness of e-banking systems used in South Africa, the reasoning is **deductive**. The selected paradigm is not chosen for any reason other than the convenience and fitting the available research and the research conducted for this paper.

4.3 RESEARCH METHODOLOGY

The Technology Acceptance Model (TAM) was chosen as the theoretical model of choice, despite various criticisms against it. The reasons to use TAM as the methodological basis for this research is:

- It is a relatively easy methodology to understand and use,
- It is easy to change, extend or modify the methodology without losing meaning,
- It is adaptable enough to fit into several research paradigms without enforcing a specific approach.

4.4 HYPOTHESES

Aside from the normal Perceived Usefulness and Perceived Ease of Use presented by the TAM methodology, seven external variables were identified which would provide understanding of the **importance** and **actual** performance of e-banking systems used by South African businesses. These seven variables are based on 32 factors, each of which belongs to one of the seven variables listed below. The source and selection of the 32 factors in the survey is described below in Paragraph 4.6.1.

i. Accuracy of e-business functions.
ii. The speed at which functions are executed.
iii. The availability of the needed functions.
iv. The cost-effectiveness of functions required from the e-business solution.
v. The security and privacy capabilities of the e-business function.
vi. The responsiveness of the bank / supplier to support the e-business solution.
vii. Innovativeness displayed by the bank considered.

The hypotheses decided upon are:

H1: The perceived usefulness (PU) of the e-business solution positively impacts the intention to continue using the e-banking solution.

H2: The perceived ease of use (PEOU) of the e-business positively impacts the intention to continue using the e-banking solution.

H3: The positive experiences of the e-business solution's external variables, positively affects the intention to continue using the e-business solution. The external variables are sub-hypothesised by refining to the following variables:

H3a: Accuracy of information

H3b: Speed of execution

H3c: Availability of functions

H3d: Cost effectiveness

H3e: Security to Access and protection of privacy

H3f: Responsiveness to requests

H3g: Innovativeness

4.5 RESEARCH MODEL

The research model derived by modifying the standard TAM model is pictorially described below.

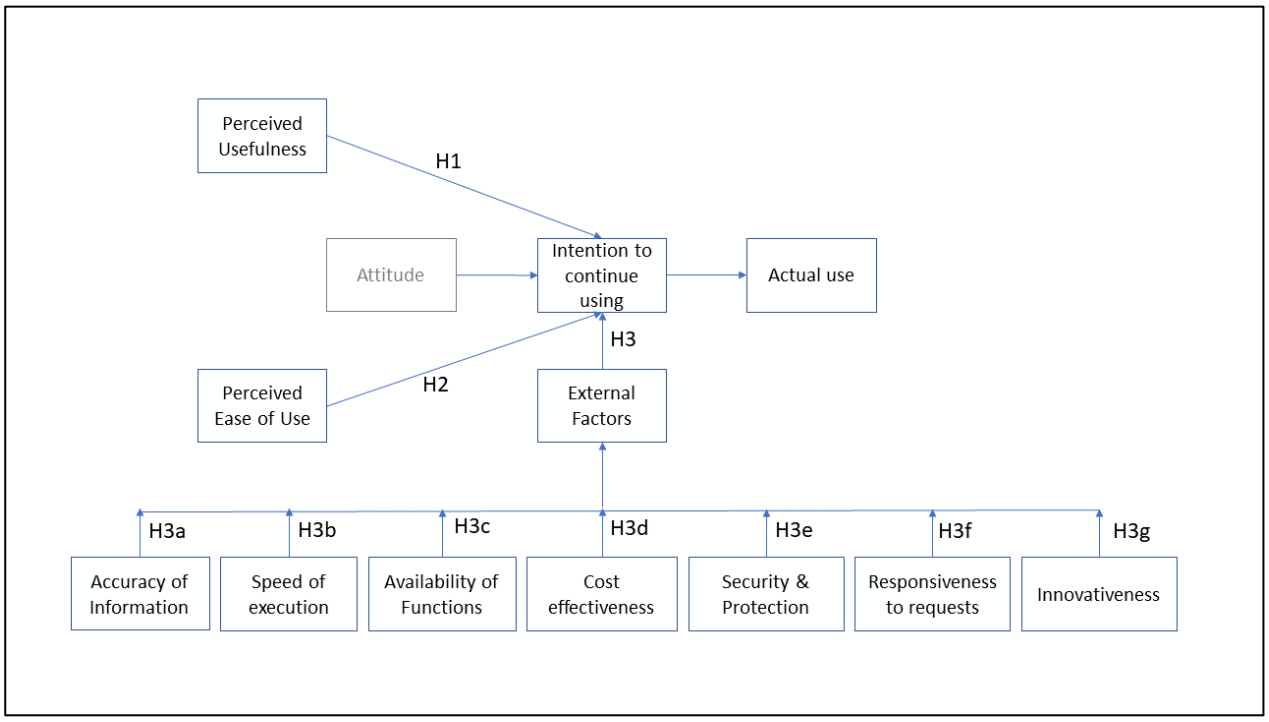

Figure 12 - Adapted TAM model

Apart from including the seven external factors playing a role in the research model, the item "Intention to use" is changed to "Intention to continue using". The reason for this change is because of the studied e-banking systems already being in use by clients, in many cases for many years. The purpose of the research is to determine how effective the systems in use are.

4.6 RESEARCH INSTRUMENTS

The data used to validate this research was obtained by using a three-pronged approach. Firstly, data was obtained directly using a research survey distributed via e-mail to South African businesses using e-banking. Secondly, data was extracted from a set of research articles done for a similar purpose with matching hypotheses or research objectives. The third source of research data was obtained by conducting a direct comparison of the data received and analysed in this research to the results obtained by Miller and Doyle (1987).

4.6.1 SURVEY

A copy of the survey distributed for completion is available in Appendix B. The survey items were derived by using the research survey designed by Miller and Doyle (1987) to determine the effectiveness of information systems of financial institutions. The Miller and Doyle research survey was modified by removing all factors related directly to internal information systems, and by adding 7 factors related to modern, outward facing e-banking systems. The 32 subject-related questionnaire factors, reflected in appendix B, were designed to measure values on a Likert scale between one and seven, with one being particularly low and seven being very high. A score of four is considered as neutral. The 32 factors are aimed at providing measurements for the seven identified external variables as listed above in paragraph 4.4, as well as for the two additional variables, Perceived Usefulness and Perceived Ease of Use, as per the adjusted TAM model proposed. A section requesting additional data is also included to provide demographic context to the survey, requesting the economic sector, retail business type, geographical region in which the retailer resides, and other contributing factors of interest. The results obtained from the survey answers are analysed using elementary statistical analysis to determine the mean scores in different dimensions, the standard deviation between associated variables, and to calculate the Pearson's correlation coefficient (r) at different levels of aggregation. The correlation between the two sets of scores, **Importance** and **Actual**, is of specific importance as a measure of determining the effectiveness of the e-banking systems used by external clients.

The advantages and disadvantages of using a questionnaire to obtain input have often been debated. Hackett (1981) states that surveys may be subjected to the following **weaknesses and limitations**:

- It may be easy to misuse,
- The depth obtained from interviews is not achieved,
- It can be applied inappropriately,
- It can become expensive in money and time to conduct,
- The information collected may be superficial or inadequate, and
- It may be subjected to low response rates.

Despite the above disadvantages, it is still the best means to reach a relatively large population group within a limited time. If the questions are formulated properly and validated well enough, the results need not be biased or inadequate.

Advantages of using survey questionnaires include:

- A wide coverage can be achieved for the results to be used to form generalised conclusions.
- A lot of data can be assembled and interpreted in a short period of time at relatively low cost.
- It is easy to replicate the research for validation or in later longitudinal studies with an expected consistent outcome.
- Interviewer bias is eliminated.

4.6.2 SYSTEMATIC LITERATURE REVIEW

A second source of data was obtained by conducting a systematic review of the literature, specifically limited to e-banking acceptance or satisfaction. The process of selecting relevant research literature is described in Paragraph 5.2 in Chapter five.

4.6.3 DIRECT COMPARISON TO MILLER AND DOYLE (1987)

This third leg of research was done to validate the outcome of this research against the findings by Miller and Doyle (1987), and to ensure that the survey was independent, robust, reliable and complies to the rigour requirements of research.

4.7 DATA COLLECTION

Data collection was done using the internet survey facility, Qualtrics, to publish the survey. Clients were invited by sending mass e-mail to independently sourced clients to participate in the survey, with a link to the specific website included, which routed the clients to the correct survey page directly and effortlessly. The processing and outcome of the data collection is described in Chapter 5.

4.8 DATA ANALYSIS

The analysis of the data collected from various sources and using a variety of measures, is discussed in Chapter 5. The factor analysis is done on the results obtained from a research survey distributed via e-mail businesses in South Africa. The substantially improved and

advanced statistical functions in Microsoft Excel 2016™ were used to determine the mean scores, calculate the correlation coefficients and standard deviations.

4.9 ETHICS

4.9.1 LEGAL

The researcher intends to protect all legal rights as may be relevant of all participants and affected stakeholders during the research process. This includes the right to the protection of personal information, protecting possible copyrights and patents, and not divulging trade secrets or strategies which are used to commercially benefit any participant contributing to this research.

4.9.2 BUSINESSES' RIGHTS

The rights of the businesses participating will not be compromised as to remaining anonymous. This right will be honoured throughout the research process. Furthermore, the research results in all forms will be presented upon request to the businesses for scrutiny and comment before distributing, submitting or publishing.

4.9.3 INDIVIDUALS' RIGHTS

As per Oates (2005), the rights of individuals are:

- All individuals will have the right to decline participation in interviews.
- Individuals have the right to withdraw from an interview if they wish to not participate any longer.
- Individuals are given the opportunity to provide informed consent.
- All individuals have the right to remain anonymous.
- All individuals have the right to confidentiality.

The rights described above will be honoured throughout the research project and thereafter.

4.9.4 RESEARCHER UNDERTAKING

The researcher undertakes the following:

- The researcher will not unnecessarily intrude upon the activities of the participants.
- The researcher will behave with integrity throughout the research. This means not manipulating data obtained to support the researcher's case and by recording the data fully and accurately as supplied by the participants.

- The researcher will follow appropriate, laid down professional codes of conduct as may be prescribed by professional bodies, as well as the ethics committee of the university.
- The researcher will ensure that no plagiarism is committed, intentionally or otherwise.

If it is required of the researcher to review or participate in the research of another researcher, to always act ethically by being prompt in reviewing and maintaining confidentiality of the work reviewed, and by reviewing in a professional manner.

5 DATA ANALYSIS AND FINDINGS

5.1 INTRODUCTION

Since data acquisition was done from three dimensions, the description, analysis and presentation of the data is discussed in this chapter. Comparisons are done between a limited set of questionnaire responses as part of this research paper, information obtained from a set of articles with previous similar research completed, as well as a comparison between the research data and previous research done in South Africa on Information System effectiveness in the Financial Sector by Miller and Doyle (1987). Once all this data is compared, a conclusion is drawn regarding the hypotheses which were presented in Chapter 4. The analysis of the number of responses (sample size = 47) is not done exhaustively. Only a limited set of statistical values were calculated and used to compare to the previous studies as listed above. This was decided since most of the comparative previous research listed and discussed here, already did exhaustive statistical analysis.

5.2 DATA COLLECTION: A SYSTEMATIC LITERATURE REVIEW

5.2.1 OBTAINING RELEVANT PREVIOUS RESEARCH

Protocol Development

- Research questions

The main research question stated in Chapter 1 was:

> ***"How effective are current electronic banking systems used in South Africa, based on client experience?"***.

From this question one can deduce some keywords to find previous research which can be used as comparative input. The main keywords decided upon were "e-banking", "adoption" and "effectiveness". Applying these keywords on academic research articles is described below.

- Search strategy

All the initial searches were initiated from the library portal of the University of Pretoria, using the link to Google Scholar. Keyword searching was used with an initial broad search and continuously refined by adding more required keywords until a manageable result set was obtained. The list of results was then subjected to additional selection steps and criteria. The steps are listed below in Table 10.

Table 10 - Reference Search Strategy

Platform Used	Keywords / Actions	Results obtained
Google Scholar	*Keyword (e-Banking)*	38,900
"	*Keywords (e-Banking, adoption)*	19,300
"	*Keywords (e-Banking, adoption, effectiveness)*	14,900
"	Added custom range dates from 2000 to 2017	14,300
"	*Keywords (e-Banking, adoption, effectiveness, businesses)*	13,800
"	Limited searching to the first 20 Pages	200
Manual using Word and Excel	*specific keywords (adoption, acceptance or effectiveness as well as e-banking or electronic banking) and a country name was listed in the title or abstract. Removed articles listed where the research subject was not relevant to this research study.*	39
UP Database plus https://beallslist.weebly.com/	*Determine which articles are listed in possible predatory publishing web sites*	33

Once the list of articles in Table 10 were finalised and captured into EndNote, the reference lists of these articles were scrutinised to obtain other relevant referenced material to be used in the research description, e.g. the methodology used, references to previous similar studies by objective or by country, etc. This additional step did not increase the number of research articles to be used but enriched the rest of the research by supplying additional information regarding the research background.

The search keywords for the list of 200 articles on the first 20 pages returned in Google Scholar were then reapplied to obtain research conducted specifically in South Africa. This was done by adding "South Africa" as another search keyword. The resulting set was again limited to 20 pages (200 results) and inspected. From this search, six articles were obtained which positively associated to the research subject at hand.

- Inclusion / exclusion / quality

Of the research papers harvested at this point, the following criteria were applied to further ensure usable publications were obtained:

- No stated hypotheses (Ezzi, 2014, Gikandi and Bloor, 2010, Loonam and O'loughlin, 2008, Tat and Nor, 2015).
- No findings published in line with hypotheses (Akinci et al., 2004).
- No clearly stated research methodology documented in the article (Akinci et al., 2004, Gikandi and Bloor, 2010, Loonam and O'loughlin, 2008, Tat and Nor, 2015).
- Longitudinal and / or interpretive papers (Gikandi and Bloor, 2010, Loonam and O'loughlin, 2008).
- Papers published through "predator" publishers where no proper peer reviews are conducted. Often these publications do not appear in any other cataloguing database. Six research papers were found to have been published on journal sites listed as predatory journals (Al-Ajam and Nor, 2013, Chigamba and Fatoki, 2011, Foon and Fah, 2011, Marwaha, 2017, Massilamany and Nadarajan, 2017, Yeow et al., 2008).

The remaining publications were of sufficient quality, volume and detail to supply useful comparative detail.

- Data extraction

During the search process, Table 28 in Appendix C was constructed. The various research methodologies and hypotheses were extracted from the articles as stated. Since the initial search was executed through Google Scholar, the list was subsequently expanded to include the second search platform and the database and publisher where the article was found. The analysis results were summarised by the hypothesis statement as per this research in a separate table included below. The findings and conclusions were also listed in the table to compare directly to the hypotheses and findings of this research.

Table 11 - Article Search Findings

Variable / Reference	Finding	Measure	Score	Comment
Perceived Usefulness				
(Al-Ajam and Nor, 2013)	Supported	Cronbach α	0.921	
(Amin, 2009)	Supported	Cronbach α	0.797	
(Ayo et al., 2010)	Supported	Cronbach α	0.803	
(Cheng et al., 2006)	Supported	Cronbach α	0.929	

Variable / Reference	Finding	Measure	Score	Comment
(Lee, 2009)	Supported	Cronbach α	0.91	
(Naimi Baraghani, 2008)	Supported	Pearson r	0.835	
(Pikkarainen et al., 2004)	Supported	Pearson r	0.722	
(Tan et al., 2010)	Supported	Cronbach α	0.869	
(Maduku, 2013)	Supported	Pearson r	0.703	
Perceived Ease of Use				
(Al-Ajam and Nor, 2013)	Supported	Cronbach α	0.949	
(Amin, 2009)	Supported	Cronbach α	0.845	
(Ayo et al., 2010)	Supported	Cronbach α	0.805	
(Cheng et al., 2006)	Supported	Cronbach α	0.934	
(Lee, 2009)	Supported	Cronbach α	0.9	
(Naimi Baraghani, 2008)	Supported	Pearson r	0.865	
(Pikkarainen et al., 2004)	Not supported	Pearson r	0.666	
(Tan et al., 2010)	Supported	Cronbach α	0.81	
(Maduku, 2013)	Supported	Pearson r	0.703	
System speed/quality				
(Pikkarainen et al., 2004),	Excluded			Excluded from findings
Cost				
(Tan et al., 2010),	Supported	Cronbach α	0.837	
Security and protection				
Ozlen, 2017	Supported	Mean	5.278	Only one item
Ayo et al., 2010	Not supported	Path r	0.600	
Cheng et al., 2006	Supported	SEM	?	Value not stated
Lee, 2009	Supported	SEM	?	Value not stated
Naimi Baraghani, 2008	Supported	Path r	0.131	
Pikkarainen et al., 2004	Supported	Cronbach α	0.900	
Tan et al., 2010	Supported	Cronbach α	0.774	
Maduku, 2013	Supported	Cronbach α	0.935	

Variable / Reference	Finding	Measure	Score	Comment
Innovativeness				
Al-Jabri, 2012	Supported	Cronbach α	0.858	

- Journal list for selected articles

The following list of publications were found to contain the research articles selected for use.

Table 12 - List of publications used for research source material selected

Publications	Type	#
African Journal of Business Management	Journal	1
Archives of Business Research	Journal	1
Assessment	Journal	1
Communications of the Association for Information Systems	Journal	1
Decision support systems	Journal	1
Electronic Commerce Research	Journal	2
Electronic commerce research and applications	Journal	1
Indian Journal of Commerce & Management Studies	Journal	4
International Journal of Bank Marketing	Journal	1
International Journal of Business & Society	Journal	1
International Journal of Business and Information	Journal	3
International Journal of Business and Management Science	Journal	1
International Journal of Information Management	Journal	2
Internet Research	Journal	1
IST-Africa Week Conference, 2016	Conference	1
Journal of Accounting and Management Information Systems	Journal	1
Journal of Electronic Commerce Research	Journal	1
Journal of emerging trends in economics and management sciences	Journal	1
Journal of the AIS	Journal	1
Journal of the Association for Information Science and Technology	Journal	1
Lulea University of Technology	Dissertation	1
Management science	Journal	1
Marketing Intelligence & Planning	Journal	1
Southern African Business Review	Journal	1
Telematics and informatics	Journal	2
The Journal of Internet Banking and Commerce	Journal	1

Citation Management

- Use of Endnote

It was decided from the start that Endnote version X8 is used for both the thesis, as well as listing and grouping sources of reference as these were found in academic searches. It is made available free of charge by special arrangement between the University of Pretoria and the software developers, Clarivate Analytics.

- Rigour, Credibility, Relevance, Quality

Each of the selected articles were further inspected to determine that these articles represent acceptable quality and credibility, and that appropriate and thorough methods and standards were applied throughout the research process in the for each study. The outcome of this filtering process is documented in Table 29 in Appendix D.

5.2.2 GLOBAL E-BANKING STUDIES

The selected articles were studied to obtain insight from the research work done in other countries, as well as the research methodologies used. There was a total of 39,937 samples used in the articles. One article was particularly extensive with 28,945 samples (Xue et al., 2011). This was achieved by engaging the branches of a selected bank in the United Stated of America, which requested their clients to participate in the survey over a period. Another larger sample size was 3,519 (Polasik and Piotr Wisniewski, 2009). The rest of the articles contained less than 600 samples.

Several different methodologies were used in these studies to test various hypotheses formulated. Below is a summary of the methodologies and the articles which used each methodology. The methodology most used is TAM and the derivatives of TAM, accounting for nine of the articles. UTAUT was used in five studies, six other methodologies were used. These methodologies included Random Utility Model (RUM) (Manski, 1977, McFadden, 1980), Diffusion of Innovations Theory (Rogers and Shoemaker, 1983), Decomposed Theory of Planned Behaviour (DTPB) and Delphi (Linstone and Turoff, 1975). For five studies, there was no research methodology described in the article.

Table 13 - Summary of Methodologies used

Methodology used	Number of Articles	References
UTAUT[1]	3	(AbuShanab et al., 2010, Martins et al., 2014, Yu, 2012)
TAM/TAM2/ETAM[2]	8	(Amin, 2009, Ayo et al., 2010, Cheng et al., 2006, Ezzi, 2014, Lee, 2009, Naimi Baraghani, 2008, Pikkarainen et al., 2004, Tan et al., 2010)
Other	7	(Eriksson et al., 2008, Gerrard and Barton Cunningham, 2003, Loonam and O'loughlin, 2008, Polasik and Piotr Wisniewski, 2009, Shon and Swatman, 1998, Tan and Teo, 2000, Xue et al., 2011)
Not described	5	(Gikandi and Bloor, 2010, Akinci et al., 2004, Hanafizadeh et al., 2014, Loonam and O'loughlin, 2008, Tat and Nor, 2015)

It is also necessary to consider the differences between geographically distinct regions. The outcomes of the 23 articles studied are listed below in Table 14 only where the region or country was stated. Twelve articles were found where research was done in eleven different countries. Notably scant from these research studies are North and South American countries. Europe, Africa, the Middle East and Far East are present in the research articles found. Research excluded from Table 14 are Turkey (Akinci et al., 2004), Kuala Lumpur (Malaysia), Kenya (Gikandi and Bloor, 2010), Ireland (Loonam and O'loughlin, 2008), India (Tat and Nor, 2015) and Australia (Yeow et al., 2008).

Table 14 - Usable Articles per Country

Country	Article
Jordan	(AbuShanab et al., 2010)
Northern Borneo,	(Amin, 2009)

[1] Unified Theory for Acceptance and Usage of Technology.
[2] Technology Acceptance Model, including derivatives and later revisions.

Country	Article
Malaysia	
Nigeria	(Ayo et al., 2010)
Hong Kong, China	(Cheng et al., 2006)
Estonia	(Eriksson et al., 2008)
Singapore	(Gerrard and Barton Cunningham, 2003)
Portugal	(Martins et al., 2014)
Iran	(Naimi Baraghani, 2008)
Finland	(Pikkarainen et al., 2004)
Poland	(Polasik and Piotr Wisniewski, 2009)
Malaysia	(Tan et al., 2010)
Australia	(Shon and Swatman, 1998)

5.2.3 E-BANKING STUDIES CONDUCTED IN SOUTH AFRICA

There were five research articles distilled from the list of articles which specifically were conducted in South Africa, or had pertinent relevance to South African e-banking solutions (Maduku, 2013, Masocha et al., 2011, Mujinga et al., 2016, Porteous, 2006, Sabharwal, 2016).

5.3 OWN RESEARCH CONDUCTED

5.3.1 SURVEY RESULTS DISCUSSION

Since the survey was intended to follow the TAM methodology, 32 factors were formulated which are categorised into the two TAM constructs namely, Perceived Usefulness and Perceived Ease of Use, plus another seven external factors listed in Table 15. The 32 factors had to be considered against two measures namely, **Importance** and **Actual**. This required the respondent to consider how important a specific item was to his/her business and to rate the actual experience for the current e-banking system being used for that specific factor. This facilitates the evaluation of what the expectation is against the actual performance of the e-banking system. The results summary for this is reflected in Table 15.

Table 15 - Factors grouped and average score shown

Factor Groups	Importance	Actual	Difference	Questions
Perceived Usefulness	5.7	4.8	-0.9	2, 12, 26, 31
Perceived Ease of Use	5.9	4.7	-1.2	3, 4, 25, 28, 29, 32
Accuracy	6.1	5.3	-0.8	5, 8, 14
System Speed	6.3	5.0	-1.3	6, 10
Functionality	5.9	4.9	-1.0	1, 9, 18
Cost	6.3	4.8	-1.6	16
Security and Protection	6.5	5.6	-0.9	7, 11
Responsiveness	6.1	4.7	-1.4	13, 19, 20, 21, 24, 27, 30
Innovativeness	5.3	4.5	-0.8	15, 17, 22, 23

Demographics were specifically ignored for possibly influencing the results for this study. The purpose of this research study is to determine business experience of the effectiveness of the e-banking system used. **Gender, Age, Voluntariness and Experience as demographic factors were felt to play no significant roles in the research since all participants already used e-banking systems in a business context, and were also well experienced in the use of the systems.** The systems were thus assumed to be used to the extent that age and gender should not play a role anymore. What was requested from a demographic perspective is:

- The economic sector (retail, fuel, medical services, transport, etc.),
- The size of the business in terms of head count,
- The South African Province,
- The bank currently supplying the e-banking service.

No specific research was conducted to determine if any of the demographic factors impacted the results achieved. The graphs below give an overview of the spread of demographical data received.

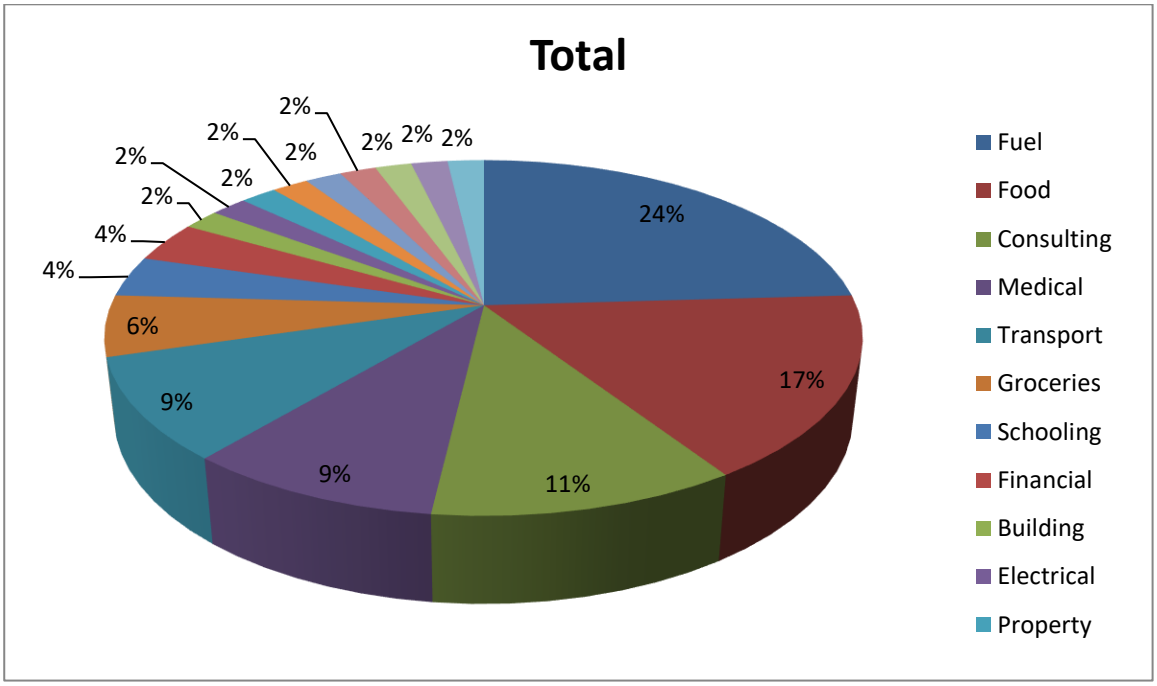

Figure 13 - Survey responses by industry sector

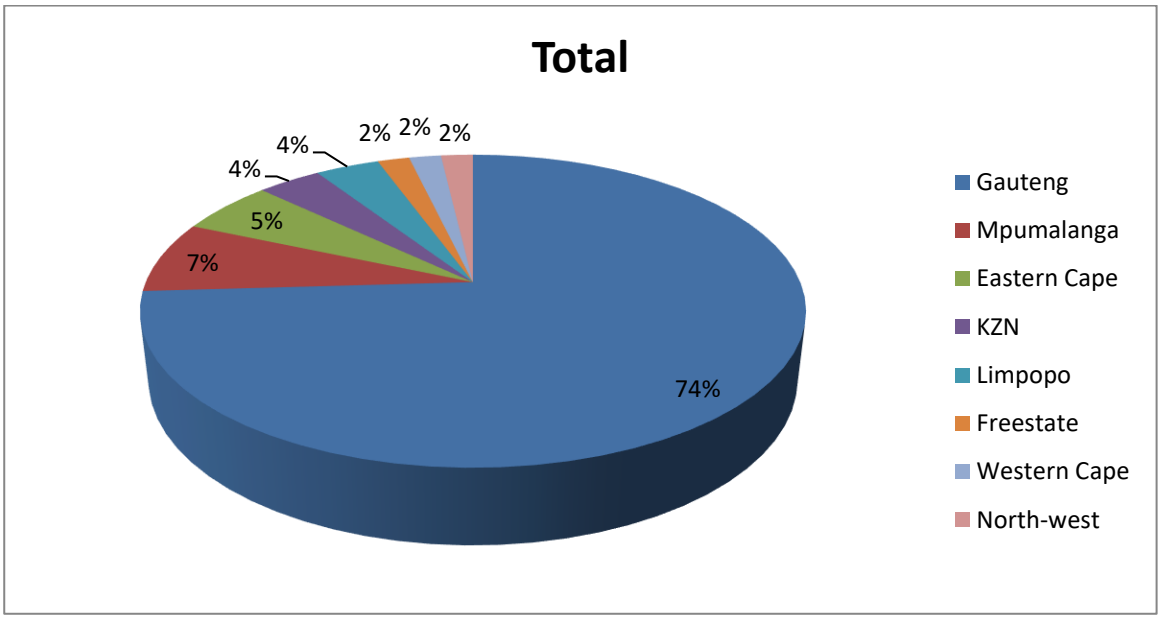

Figure 14 - Response ratio by South African Province

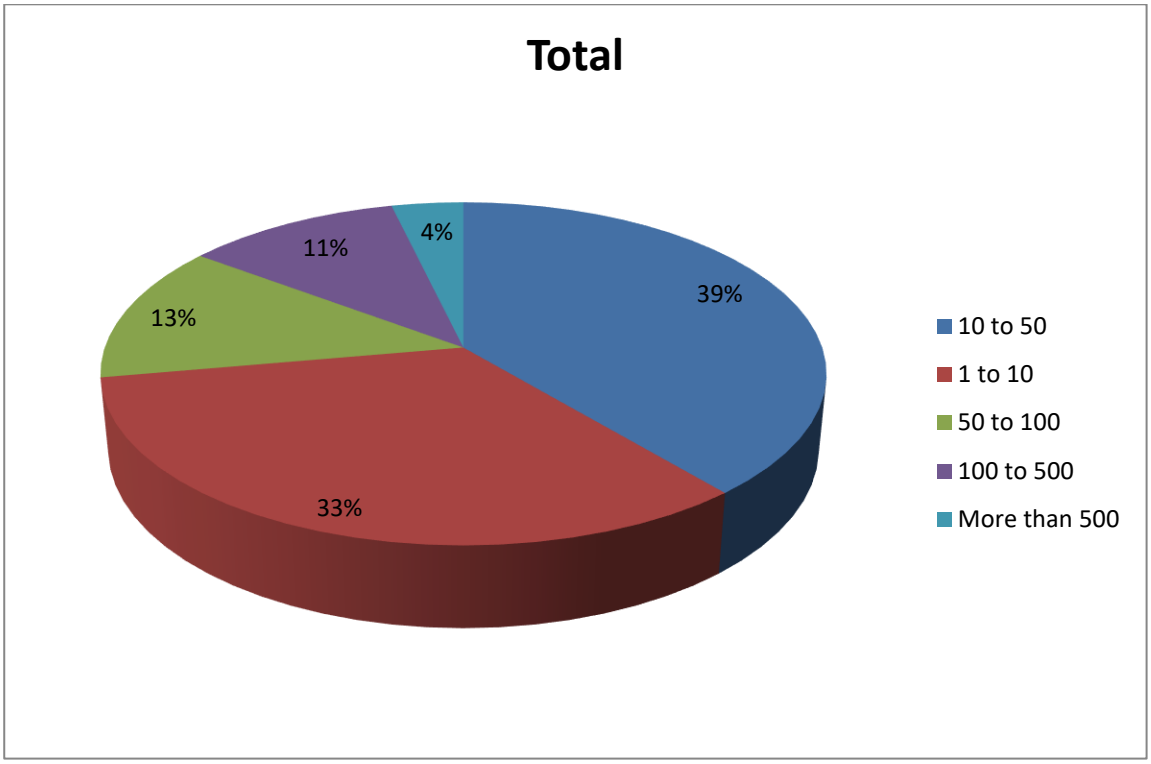

Figure 15 - Company size by employee count

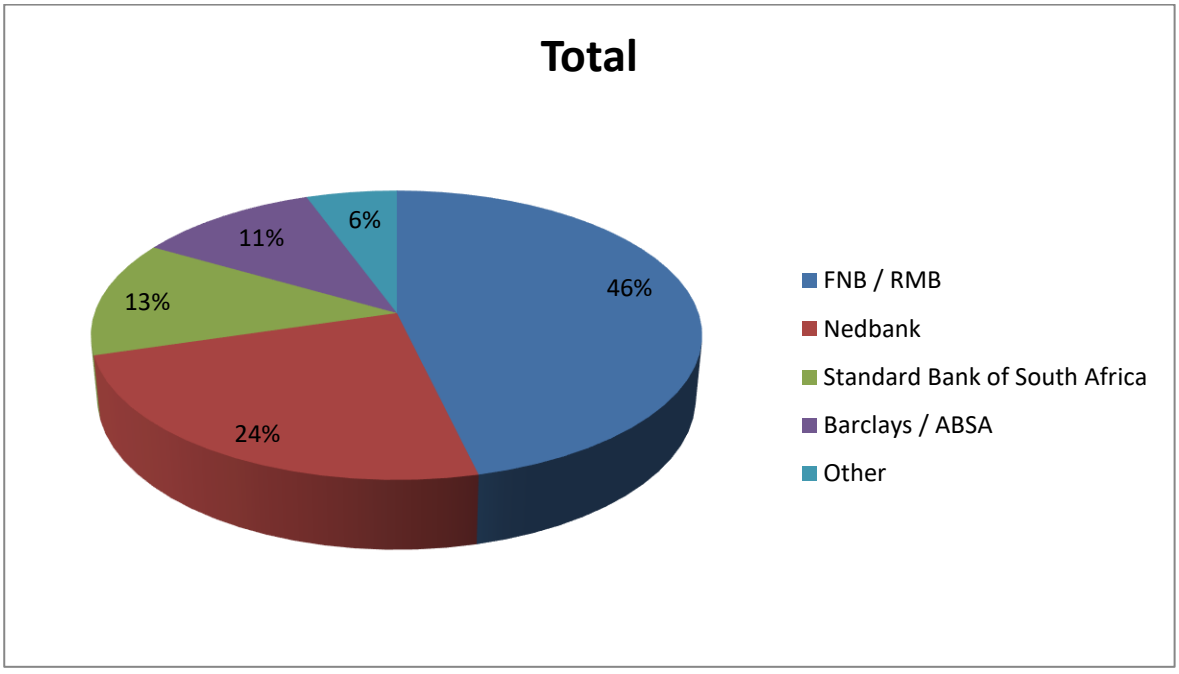

Figure 16 - Responses received by SA bank

An e-mail request with a link to a survey collection site (http://www.qualtrics.com) was sent to recipients using e-mail addresses obtained from an independent source. More than 2200

e-mails were sent out. 443 of the e-mail invitations were successfully delivered to active mail boxes. The rest of the e-mails had either no response, a mailbox being full message returned, or e-mail address not registered. 54 participants responded, representing a 12,2% response to the survey request. Seven of these returned surveys were not finalised and had to be discarded, leaving 47 useful responses being 10,6% response rate. The 47 surveys provided limited, but measurable input which can be compared to the results from the articles considered in paragraphs 5.2.2 and 5.2.3.

The nine groups were derived by considering the following:

- The original 38 factors listed by Miller and Doyle (1987) were individually considered, keeping in mind that several factors referred to internal conditions, i.e. applying to an Information Technology department which is part of an organisation. The users considered and used as participants in their study, were all employees of the organisation.
- The factors applying strictly to internal systems were removed from the list as there will not be a coherent response for these factors.
- Seven factors related to external internet-based systems were added. These include such important factors as security and confidentiality, speed of processing and response as well as the innovativeness of the organisation presenting the internet-based systems. These factors became significant in the last two decades.
- These factors were then grouped into the nine groups listed in Table 15. The research results were aggregated, and an average determined by dividing into the number of factors present in that group. The means value was also calculated as a more representative score. There seems to be very little difference between the mathematical average and the statistical mean values. The reason for the close scoring was not studied to find a reason. The largest group contains seven factors, being the factors measuring “Responsiveness”. The smallest group is that of “Cost”, where only one factor was presented.

Considering that Miller and Doyle (1987) used the Critical Success Factors (CSF) methodology as the theoretical model for their research, the outcome of their research model had to be matched to the responses and summary obtained in this study. It appears that the application of the CSF model as applied by Miller and Doyle aligns well to the Technology

Acceptance Model (TAM), mostly due to the presence of factors in their model that can be interpreted as factors related to Perceived Usefulness and Perceived Ease of Use. The two factors for PU and PEOU were thus incorporated in this research paper, and the other seven factors added as external factors impacting on either the intention, or on the behaviour of the systems' users. Defining each of the nine categories clears up any possible ambiguity regarding each. It also sets the scene by reviewing the scores obtained from the responses received, to compare to previous research from the research articles reviewed, as well as comparing to the historical research findings as published by Miller and Doyle. Due to the limited number of responses, full statistical analysis may not prove conclusive outcomes. It was still performed, and the results are shown in Tables 16 and 17 below. Considering the overall score values in Table 16, there seems a strong correlation of 0.69 between **Importance** and **Actual** scores for all factors considered. The Pearson correlation coefficient was calculated using the Excel function **"=CORREL(array1, array2)"** as implemented in Microsoft™ Office 2016 and Office 365.

Table 16 - Overall Statistical Scores

OVERALL VALUES		
MEASURE	**IMPORTANCE**	**ACTUAL**
MEAN	6.01	4.91
MEDIAN	6.08	4.80
AVERAGE	6.02	4.92
STD DEV	0.35	0.32
Pearson correlation (r)	0.69	

The overall Pearson correlation coefficient (r) of 0.69 indicates a strong positive linear relationship between **Importance** and **Actual** values. This is supported with a scatter graph below, where the linear relationship is supported with the trend lines between **Importance** and **Actual** points on the graph. The consistent space between **Importance** and **Actual** values indicate a relatively consistent difference between the scores. The fact that the **Actual** scores are lower is indicative of clients' expectations which are not satisfied.

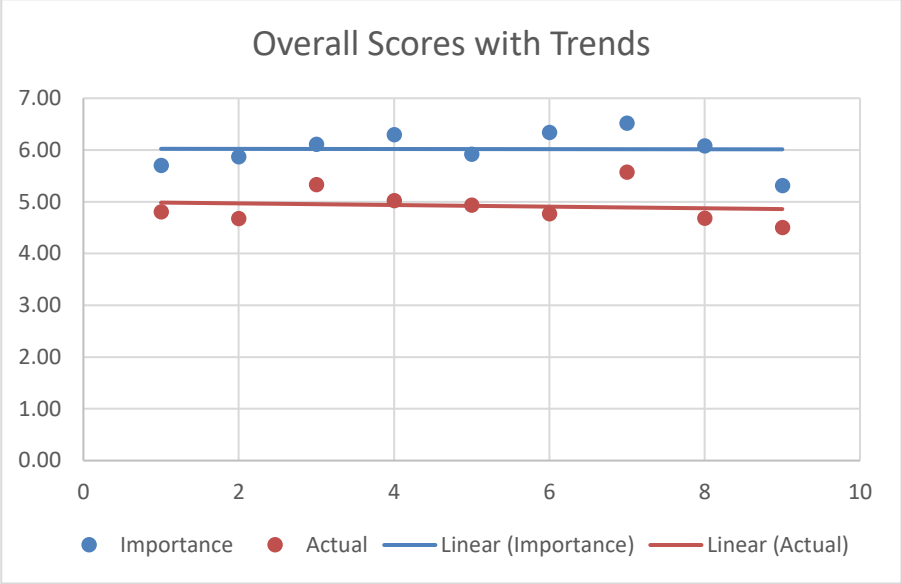

Figure 17 - Scatter graph supporting Pearson Correlation Coefficient (r)

Table 17 - Statistical Scores of Individual Groups

					IMPORTANCE			ACTUAL		
Factor Groups		**Importance**	**Actual**	**Pearson r**	**MEAN**	**MEDIAN**	**STD DEV**	**MEAN**	**MEDIAN**	**STD DEV**
Perceived Usefulness	**PU**	5.70	4.80	**0.87**	**5.70**	**5.61**	**0.28**	**4.78**	**4.69**	**0.46**
Perceived Ease of Use	**PEOU**	5.87	4.67	**0.97**	**5.87**	**5.79**	**0.26**	**4.66**	**4.61**	**0.41**
Accuracy of Information	**ACC**	6.11	5.33	**0.99**	**6.10**	**5.96**	**0.33**	**5.32**	**5.13**	**0.32**
Speed of execution	**SP**	6.30	5.02	**1.00**	**6.29**	**6.30**	**0.21**	**5.02**	**5.02**	**0.09**
Availability of Functions	**FUNC**	5.92	4.94	**0.84**	**5.92**	**5.79**	**0.21**	**4.93**	**4.94**	**0.12**
Cost effectiveness	**COST**	6.34	4.77	**Not Applicable**	**6.34**	**6.34**	**0.00**	**4.77**	**4.77**	**0.00**
Security and Protection	**SEC**	6.52	5.57	**1.00**	**6.52**	**6.52**	**0.01**	**5.57**	**5.57**	**0.21**
Responsiveness to requests	**RESP**	6.08	4.68	**0.37**	**6.08**	**6.06**	**0.15**	**4.67**	**4.64**	**0.29**
Innovativeness	**INNO**	5.31	4.51	**0.92**	**5.31**	**5.29**	**0.09**	**4.48**	**4.43**	**0.50**

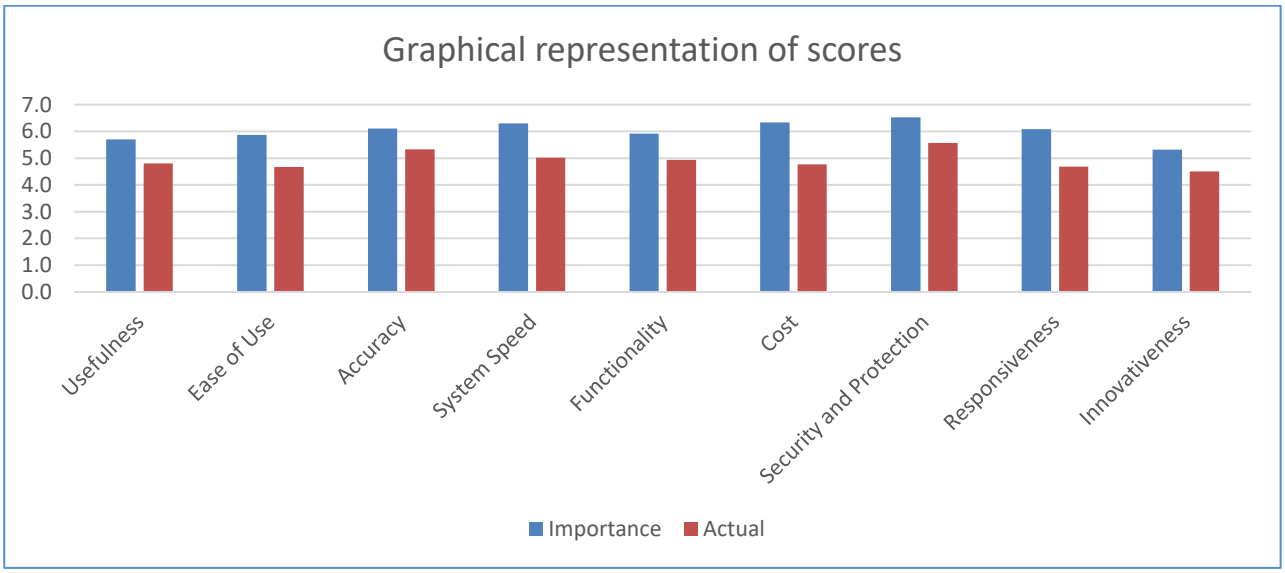

Figure 18 - Group factors - mean scores

- Perceived Usefulness:

Davis (1989) defines PU as: **"the degree to which a person believes that using a particular system would enhance his or her job performance."**

The four factors which were included into this group were:

- Volume of Information Received
- Completeness of Information
- E-business system support in your own strategic planning
- E-business system ability to adapt to your changing needs

The PU score was 5.70 on **Importance**, but only 4.80 on **Actual** performance. The difference between **Importance** and **Actual** is fairly large and may indicate that e-banking systems still lack certain required or useful functionality, which the clients may require. It may also indicate that some functions are more cumbersome to perform by the clients, than what they are expected to be.

The r value for PU is 0.87, which is a very strong positive correlation between **Importance** and **Actual** scores for this category. The other statistical results for PU is shown below in Table 18. It is noted that the **Actual** scores are persistently lower than the **Importance**

scores. The standard deviation for the **Actual** scores is significantly larger than the standard deviation for the **Importance** scores.

Table 18 - Statistical results for Perceived Usefulness

Measure	Importance	Actual
Average	5.70	4.80
Mean	5.70	4.78
Median	5.61	4.69
Standard Deviation	0.28	0.46

It could become a worthwhile market research project for banks to determine what is required by clients that the e-banking systems do not currently cater for sufficiently, particularly considering the present high competitiveness amongst South African banks with their e-banking systems and functionality.

From the above calculations and discussion, it is deduced that hypothesis H1 is supported.

- Perceived Ease of Use:

PEOU is defined by Davis in the same paper as: **"the degree to which a person believes that using a particular system would be free of effort.".**

Six factors were used in this group. These are:

- Ease of access to e-business system
- Ease of retrieving information
- Effective training in use of e-business system
- Degree of control over which functions and services are received
- Your own feelings of participation
- Amount of effort to integrate external e-business system into your systems

The PEOU **Importance** score received 5.87 with the **Actual** score being 4.67, calculated as an average score for each. The difference of 1.2 points in scoring may be an indication that

clients place a premium on the e-banking systems being easy to use, but that these systems may be more complex to navigate, understand, and to conclude desired transactions than what is expected.

An r value of 0.97 between PEOU **Importance** and **Actual** scores indicate an almost perfect positive linear relationship. The rest of the statistical results are shown below in Table 19. The same trend is noted as for PU, where the **Actual** scores are consistently lower than the **Importance** scores. The standard deviation for Importance at 0.26 but 0.41 for Actual scores, is like the PU scoring. Although the deviation difference is not exceptionally large, it is still worth noting. It may indicate actual differences between the e-banking systems of different banks, but may also be the result of individual differences in scoring due to the small sample size from which the results are obtained.

Table 19 - Statistical results for Perceived Ease of Use

Measure	Importance	Actual
Average	5.87	4.67
Mean	5.87	4.66
Median	5.79	4.61
Standard Deviation	0.26	0.41

A further discussion of the differences in score between PU and PEOU is reflected below against research done by Brown et al (2002).

From the above discussion and findings, it can be deduced that hypothesis H2 is supported.

- Accuracy of information:

Three factors were used to determine and measure, namely “Currency of information”, “Accuracy of Information” and “Relevance of information for intended use”. Of note is the fact that clients of e-banking systems scored the **Importance** rating at 6.1. The **Actual** score is only 5.3. These scores are derived from the means of the individual scores for the three factors for both **Importance** and for **Actual**. The difference of 0.8 in actual experience

versus the perception of importance thus means that clients feel that e-banking systems lack somewhat in the accuracy, currency and relevance regarding the availability of information against their expectations.

The r value for measuring Accuracy is 0.99. This is a very close correlation between **Importance** and **Actual** scores. Considering the rest of the statistical results in Table 20 below, the standard deviation of 0.33 for **Importance** compared to 0.32 for **Actual** scores are almost identical. It indicates that the clients' accuracy expectations are generally in line with actual accuracy delivered.

Table 20 - Statistical Results for Accuracy

Measure	Importance	Actual
Average	6.11	5.33
Mean	6.10	5.32
Median	5.96	5.13
Standard Deviation	0.33	0.32

Based on the responses and statistical outcome, it is deduced that hypothesis H3a holds true and is supported.

- Speed of Execution:

The two factors included to define Speed of Execution are "System availability and reliability" and "Quick and flexible access to required information". The combination of these two factors enables clients to fulfil the required tasks with a minimum of delay. It is clear from the average score on the two factors that productivity and a minimum delay is very important to clients with the **Importance** measure at 6.3. With **Actual** score at 5.0, there seems to be a rather large difference between what clients want and what they receive. The overall performance of a system is reliant on various technologies. The reliability of a system, as well as the quick and flexible access to a system are mostly within the control of the banks. Availability and network speed is subject to external influences, thus not being entirely within the control of the banks. Overall it seems that clients generally desire better system performance then what they receive.

The r value for system speed is a perfect 1.00. This indicates a perfect linear uphill relationship. It could be caused by the factor grouping consisting only of two factors. This leaves little room for statistical variance. Standard deviation is particularly low at 0.09.

Table 21 - Statistical results for Speed

Measure	Importance	Actual
Average	6.30	5.02
Mean	6.29	5.02
Median	6.30	5.02
Standard Deviation	0.21	0.09

Even though only two variables were present in this hypothesis item, the calculated results lead to accepting that hypothesis H3b is supported.

- Availability of Functions:

Availability of Functions consists of three variables, namely “Availability of Information”, “Flexibility of information received” and “Ability to support decision-making”. The first two variables were aimed at measuring the operational performance and delivery aspects of an e-banking system, while the third factor intends to measure the degree of support at a strategic decision-making level in the clients’ businesses. The overall score was 5.9 for **Importance**, with **Actual** performance scoring 4.9. Both **Importance** and **Actual** scores were lower in comparison to other groups. It may indicate that clients have alternative means of obtaining the required information from their own internal systems, and only use e-banking systems to confirm or reconcile that which they have available.

The Pearson coefficient (r) for the Availability of Functions group of factors is 0.84. This is a very strong positive correlation between **Importance** and **Actual** scores. The average, mean and median figures for the Functionality group also run very close in both result sets, i.e. **Importance** scores are 5.87, 5.87 and 5.79 respectively, while the **Actual** scores are

4.67, 4.66 and 4.61 respectively. The standard deviation of 0.26 for **Importance** is somewhat better than the standard deviation of 0.41 for the **Actual** scores.

Table 22 - Statistical Results for Availability of Functions

Measure	Importance	Actual
Average	5.87	4.67
Mean	5.87	4.66
Median	5.79	4.61
Standard Deviation	0.26	0.41

Based on the calculated statistical measures for the Availability of Functions, it can be deduced that hypothesis H3c is supported.

- Cost Effectiveness:

Only one factor was listed related to cost, being "Cost-effectiveness to use the system". This may be a contentious measure in the sense that often the e-banking system access and use is included in the overall cost of banking for a client but marketed by bank as a "free" service. This was different previously when banks used to bill clients separately for online systems, but with the omni-presence of the internet, coupled with cheap connection services and high-speed networks, this changed substantially. Some points to consider here are:

i. What is the cost of internet access for the client?
ii. What are the banking fees the client pays per month?

Clients may have confused the cost-effectiveness factor with overall cost of banking. An **Importance** of 6.3 and **Actual** score of 4.8 still warrants further investigation by banks to determine the precise reason or reasons for this perception amongst customers.

As for the statistical analysis results, the fact that only one factor was included in the cost grouping yielded irrelevant statistical results and will therefore not be discussed in this section.

Despite the shortage of factors upon which to measure this variable, it can still be deduced that based on the relatively high **Importance** score, hypothesis H3d is supported.

- Security and Protection:

Security and Protection is measured against two factors, namely “Confidence in System” and “System Security and Privacy”. The “Confidence in System” addresses the aspect of Trust, whilst the “System Security and Privacy” considers the safety within the system to safely and securely conduct financial transactions and other functions free from interceptions by cyber-crime. It also addresses the fact that clients require their information to be securely and safely protected from digital theft and for illicit purposes. This group of factors is the group that obtained the highest **Importance** rating at 6.5. The **Actual** score ended at 5.6 which is much lower than expected. It possibly indicates a detectable scepticism in the protection of personal details by clients. It warrants further research to determine the reasons why there is such a difference in scores. As in the case of Speed of Execution, this group only consisted of 2 factors to measure. This resulted in insufficient statistical results, with an r value of 1.00. There is also almost no difference between average, mean and median scoring.

The high score for the **Importance** measurements still leads to support for hypothesis H3e.

- Responsiveness to requests:

Seven factors relate to Responsiveness to Requests and include the following:

i. “Understanding of the e-business system”,
ii. “Quality and competence of Bank support staff”,
iii. “Communication from Bank staff”,
iv. “Responsiveness to requests for change”,
v. “Quality and competence of bank technical staff”,
vi. “Bank knowledge of your business”, and
vii. “Bank’s positive attitude”.

Although seven factors may seem excessive, considering the number of factors in the other groups, these seven factors tend to represent the main factors influencing a client’s perception of the level of client service which is expected or experienced. An **Importance** measure of 6.1 means that it is a very important group of factors to clients. However, an

Actual score of 4.7 is much lower than what can be expected from such a set of critical business functions. Considering the score on each of the seven factors individually, we see the individual factor score values in Table 23.

Table 23 - Breakdown of Scores for Responsiveness

Factor	Importance	Actual	Difference
Understanding of the e-business system	5.96	5.19	-0.77
Quality and competence of Bank support staff	6.36	4.89	-1.47
Communication from Bank staff	6.09	4.64	-1.45
Responsiveness to requests for change	6.06	4.43	-1.63
Quality and competence of bank technical staff	6.19	4.74	-1.45
Bank knowledge of your business	5.85	4.23	-1.62
Bank's positive attitude	6.04	4.64	-1.40

It can be noted that from the above breakdown of the response scores, the highest **Importance** score was placed on the "Quality and competence of Bank support staff". These are the people facing the client and is expected. The biggest difference between **Importance** and **Actual** scores is for the factor "Responsiveness to requests for change" at -1.63 (**Actual** lower than **Importance**). Of the seven factors included in this group, "Bank knowledge of your business" was rated the lowest in **Importance** by clients, but still relatively high at 5.85. An **Actual** score of 4.23 is still concerning as banks should endeavour to understand a client's business better to supply the best possible e-banking experience for the client.

The r value of 0.37 indicates a weak positive linear relationship between **Importance** and **Actual** scores. In Table 24 one can see that the average, mean and median scores for both **Importance** and **Actual** scores are very close. A standard deviation of 0.15 for **Importance** against 0.29 for **Actual** is also not significant.

Table 24 – Statistical Results for the Responsiveness Group of Scores

Measure	Importance	Actual
Average	6.08	4.68
Mean	6.08	4.67

Measure	Importance	Actual
Median	6.06	4.64
Standard Deviation	0.15	0.29

From the above discussion and calculated statistical results it can thus be deduced that hypothesis H3f is supported.

- Innovativeness:

Innovativeness consists of "The use of modern look and feel interfaces", "Availability of models to evaluate alternatives", "Involvement in future development" and "Regularity of new functions and features" representing four aspects of continuous renewal and improvement. This is the group which scored the lowest in both **Importance** and in **Actual** at 5.3 and 4.5 respectively. Although it scored lowest of all nine groups, it does not make it insignificant. A score of 5.3 in **Importance** is above the neutral point of 4.0, and an **Actual** score raises the question whether banks in South Africa are doing enough to satisfy their clients' desire for more innovative solutions than the current solutions in place.

Viewing the results from the statistical analysis yields the following results. The r value of 0.92 indicates a very strong positive correlation between the values for **Importance** and **Actual**. The difference in standard deviation of 0.09 for **Importance** and 0.50 for **Actual** indicates that most responses were similar in rating the **Importance** of innovation. The standard deviation of 0.50 for **Actual** tends to indicate that not all clients experience the innovativeness of the e-banking solutions the same. By further analysing the individual responses in this group, it was noted that none of the demographic factors influenced the score specifically. It was found that the **Actual** scores on factor 17 (*Availability of models to analyse alternatives*) and factor 22 (*Involvement in future developments*) were substantially lower than the Importance scores. These two factors were scored an average 5.24 for **Importance**, but just above an average 4.1 for **Actual**. There was also substantial variation in scoring with a notable number of respondents scoring 1, 2 and 3 for **Actual**, while scoring 5 and above for **Importance**. This accounts for the higher standard deviation on **Actual** scoring. This finding provides sufficient justification for banks to become more innovative, without increasing risk, to generate new functionalities in conjunction with clients

to solve client business problems. The statistical results for Innovativeness is displayed in Table 25.

Table 25 - Statistical results for Innovativeness

Measure	Importance	Actual
Average	5.31	4.51
Mean	5.31	4.48
Median	5.29	4.43
Standard Deviation	0.09	0.50

Based on the relatively high score for the Innovativeness variable, it is deduced that hypothesis H3g is supported.

- PU and PEOU score: Additional discussion

Brown et al (2002) found that where systems were used for a period, and was mandatory to use in an organisation, the Perceived Ease of Use score seems to consistently be higher than the Perceived Usefulness score. They concluded that this may be due to the PU factors becoming less important as they do not have a choice to use the system, thus reverting to place more value on the PEOU aspects of the system. Viewing the results obtained in Figure 16, the **Importance** factors of the questionnaire results obtained, supports this finding where the PEOU score is 5.9 while the PU score is 5.7. This may be due to the fact, that in all cases the e-banking system had already been in use for several years, and that there is no possibility of operating without it anymore. It therefore became a “mandatory” system to use in client businesses. However, the **Actual** scores were the other way around with the Perceived Usefulness scoring 4.8 and the Perceived Ease of Use factors scored at 4.7. The difference is not significantly high but may indicate that developers of e-banking systems concentrate a little more on **Usefulness** instead of **Ease of Use** functionality. In general industry terms, this is referred to as building “value-add” into the presented product. In this research, the Brown et al findings are therefore contradicted.

5.3.2 CONCLUSIONS FROM OWN RESEARCH CONDUCTED

Based on the strong correlations obtained from the elementary analysis done on the research as documented above, it can be concluded that all the hypotheses as stated in Chapter 4 are all supported. Each hypothesis was also indicated as supported individually in the detailed discussion above.

5.4 COMPARISON TO PREVIOUS RESEARCH ARTICLES

5.4.1 BACKGROUND

Since this research is conducted using TAM, it makes sense to first look at the research papers that also used TAM as the theoretical model. Of the papers, nine international and one South African paper used TAM. Of the nine international papers, three could not be used with reasons as listed in 5.2.1. There were thus seven research articles which can used to compare directly on at least Perceived Usefulness and Perceived Ease of Use.

The rest of the articles were scanned to determine if any of the hypotheses correspond to the hypotheses formulated for this research. These are listed, and the outcome compared to the outcomes obtained from this research done. If wide differences are found between corresponding measures, these will be noted as possible later research subjects.

5.4.2 FACTOR COMPARISONS

Of the nine listed factors in this research, no reference of measure could be found for any of the three concepts, being Accuracy of the system, Functionality or Responsiveness of the bank staff. Quality of the Internet connection was originally included in the original research by Pikkarainen et al (2004). This corresponds with the System Speed factor of this research. After the initial factor analysis, Pikkarainen et al decided to exclude their variable for Quality of Internet Connection. The five remaining factors had corresponding research questions or variable against which a comparison can be ventured.

The most likely and best documented variables are Perceived Usefulness and Perceived Ease of Use. Nine TAM research articles measured these two items, and in all cases both concepts were supported by the outcomes obtained from the research. By considering the high mean scores received for both **Importance** and **Actual** performance in this research, the scores also support both variables.

The only research that included variables to measure the cost of the e-banking system solution was the work done by Tan et al (2010). Their finding supported the research that the cost of the solution impacts the client's intent to use the system. The corresponding factor measurement in this research also supports the impact of cost on the client's intent to continue using the system. **Importance** scored a mean score of 6.34 while **Actual** performance scored 4.77

Security and Protection was also measured by eight of the research articles considered. Only Ayo et al (2010) documented research where this variable was not supported. The other seven articles all supported the various hypotheses regarding Security and Protection (also known as Risk) negatively impacting the clients' intention to use the system. The very high mean scores of **Importance** at 6.5 and **Actual** performance at 5.6 reported for this research paper also corresponds to the findings of the articles used.

The last factor which had corresponding research is that of Innovativeness. Al-Jabri and Sohail (2012) considered the acceptance of mobile banking by clients in Saudi-Arabia. They concluded that innovation positively impacts the clients' intention to use new technology for the perceived benefits it may hold. The mean scores for this research is an **Importance** value of 5.3 and an **Actual** performance of 4.5. It corresponds to the research finding of Al-Jabri and Sohail.

5.5 COMPARISON SPECIFICALLY TO MILLER AND DOYLE

Since the initial work done by Miller (Miller, 1987, Miller, 1993), and specifically the work done by Miller and Doyle in the Financial Sector (1987), regarding the measurement of Information Systems effectiveness in use by businesses, played a significant role in forming the questionnaire and hypotheses of this research, it warrants a separate section to compare the outcomes of the historical Miller and Doyle findings to the findings of this research. For this comparison to be meaningful, the factors used by Miller and Doyle needed to be mapped to the similar factors used in the questionnaire for this research. This mapping allows the e-banking questionnaire results to be compared within the same seven groups that Miller and Doyle grouped and reported their findings. The Miller and Doyle questionnaire consisted of 38 factors which had to be rated by internal users of companies in two dimensions, being **Importance** and **Actual** performance**.** The questionnaire for this research consisted of 32 factors which required to be scored in the same two dimensions

by clients using e-banking systems in their businesses. The scoring was on a Likert scale from one to seven with one representing an irrelevant factor, four being a neutral position and seven being a critically required factor. Two of the Miller and Doyle factors (eight and fourteen) were not allocated to a specific group, thus were not considered in the results calculated. This questionnaire had six factors not originally in the Miller and Doyle questionnaire. This is due to client-facing e-banking systems in the modern internet era has additional relevant factors to consider. These factors are 4, 9, 15, 17, 23 and 32. These were allocated into the matching Miller and Doyle groups for consideration, just as some Miller and Doyle factors were excluded from this research questionnaire since they are not relevant in client-facing e-banking solutions. The mapping of the questionnaire factors used in this research to the factors as per the Miller and Doyle questionnaire is presented below in Table 26.

Table 26 - Miller Questionnaire to E-banking Questionnaire mapping

Miller #	Miller Factor	Miller Grouping	E-banking #	E-Banking Factor
1	Availability & Timeliness of reports	1	1	Availability of Information
4	Volume of output provided	1	2	Volume of Information received
11	Currency of output information	1	5	Currency of available information
18	Accuracy of output information	1	8	Accuracy of information
26	Completeness of output	1	12	Completeness of information
30	Relevance of report content	1	14	Relevance of information for intended use
35	Development of more monitoring systems	1		
36	Development of more exception systems	1		
7	Use of steering committee	2		
19	Preparation of a strategic plan for IS development	2		
28	Setting of system priorities in line with organisational objectives	2	26	E-business system support in own strategic planning
32	Modern database technology	2		

Miller #	Miller Factor	Miller Grouping	E-banking #	E-Banking Factor
33	Top management involvement in defining and monitoring IS policies	2		
34	Overall cost effectiveness for IS	2	16	Cost effectiveness to use the system
3	Communication between IS and Management	3	20	Communication from bank staff
17	User confidence in systems	3	7	Confidence in system
21	Degree of personal control for which IS services are received	3	28	Degree of control over which functions and services are received
22	User's feeling of participation	3	29	Your own feelings of "participation"
27	Users' understanding of systems	3	13	Understanding of the e-business system
5	Prompt processing of change requests	4	21	Responsiveness to requests for change
9	IS support for new user proposals	4	22	Involvement in future developments
12	Short lead time required for new systems development	4		
23	Flexibility of data/reports available	4	10	Quick and flexible access to information
29	System responsiveness to changing user needs	4	31	E-business system's ability to adapt to your changing needs
10	Ease of access for users to computer facilities	5	3	Ease of access to e-business system
16	Effective user training programs	5	25	Effective training in use of e-business system
37	Development of more analysis systems	5	18	Ability to support decision-making
38	Development of more enquiry systems	5		
		5	4	Ease of retrieving information
		5	9	Flexibility of information received

Miller #	Miller Factor	Miller Grouping	E-banking #	E-Banking Factor
		5	17	Availability of models to analyse alternatives
		5	32	Effort to integrate external e-business system in your own systems
2	Quality & Competence of Systems Analysts employed	6	19	Quality and Competence of bank support staff
15	High degree of technical competence in IS	6	24	Quality and competence of bank technical staff
20	User-oriented Systems Analysts who know user operations	6	27	Bank knowledge of your business
24	Positive IS attitude towards users	6	30	Bank's positive attitude towards clients
31	Increasing IS department effort for new systems	6		
		6	15	Use of modern look and feel interfaces
		6	23	Regularity of new functions and features added
6	Efficient running of current systems	7		
13	Low % downtime	7	6	System availability and reliability
25	Data security & privacy	7	11	System security and privacy
8	IS Department profitability			
14	Improving of new systems development			

The main comparison was done in the seven groups of scores as defined by Miller and Doyle, and using the corresponding factor mapping of Table 26, the results were calculated using the mean of scores for both Miller and Doyle and for this research's responses.

Table 27 - Means comparison between Miller and Doyle, and this research

		Miller		This Research	
Group	**Description**	**Importance**	**Actual**	**Importance**	**Actual**
1	Operational Systems	5.50	4.85	5.95	5.08
2	Strategic Issues	5.31	4.43	5.66	4.26
3	End User Involvement	5.47	4.23	5.80	4.44
4	Responsiveness	5.33	4.09	5.56	4.07
5	End User Computing	5.42	3.97	5.61	4.39
6	IS/Bank Staff Quality	5.54	4.58	5.68	4.36
7	Reliability of Service	5.83	4.71	6.44	5.21

The correlation between the two sets of results is astounding for the **Importance** rated by clients, and strong for the **Actual** performance achieved. The Miller and Doyle study was published in 1987, exactly 30 years ago at the time of this writing. The outcome in Table 27 does indicate that although technology had advanced substantially, the basic elements are still almost equally important, albeit for Miller and Doyle using internal users to complete their survey, whereas this research concentrates externally to clients using e-banking systems. The correlation coefficient for the **Importance** factors calculates to 0.91, and for the **Actual** performance factors to 0.75. It indicates an exceptionally strong correlation on the **Importance** factors, and a very strong correlation on the **Actual** performance factors. The **Reliability of Service** measurement indicates a much higher score for both **Importance** and **Actual** performance. This can possibly be indicative of the modern usage and aspects, as well as omnipresence of information systems, particularly e-business, which is becoming a core requirement to companies, indicating that reliability has become much more important than three decades ago.

5.6 FINAL RESEARCH CONCLUSION

This chapter started by discussing the steps to be taken to analyse the research. The search strategy to obtain articles specifically applicable to the research objective was also described in detail. This indicated how the number of articles were decided upon.

The next section analysed the results obtained from the survey distributed to e-banking clients in South Africa. The responses received were processed based on elementary

statistical analysis. The results for every variable measured supported all the hypotheses stated in Chapter 4.

The third section then compared the research findings for similar variables as for this research paper from the selected articles in the first section to the findings of this research. It was found that the variables Perceived Usefulness, Perceived Ease of Use, Cost Effectiveness, Security and Protection and Innovativeness were addressed. In all cases the supported hypotheses of this research were also supported for similar variables in the articles studied.

The final section cast the individual factors from the survey into the different groups as were defined by Miller and Doyle (1987). The hypotheses findings by Miller and Doyle were then compared to the findings from this research. The comparison between the groups were remarkably correlated. In all cases the **Importance** and **Actual** performance scores for this research were higher than the findings from Miller and Doyle. Considering that their research was done thirty years ago, and conducted on internal staff using internal information systems, can account for the general higher scores for this research. Technology had moved on, and information system, both external and internal, are more integrated in businesses than were the case in 1987. This comparison and positive correlation between the two sets of research results seems to support the Miller and Doyle research, as well as lends support and credibility for this research effort.

6 CONCLUSION AND SUGGESTED FUTURE RESEARCH

6.1 ANSWERING THE RESEARCH QUESTIONS

The main research question was:

> **How effective are current electronic banking systems used in South Africa, based on client experience?**

Based on the research conducted, as well as comparison of these results against previous research, supplies a measurable and repeatable answer to the main research question. Since the mean values on all variables for the **Actual** performance of e-banking systems was 4.91, it can be accepted that the current e-banking systems are effective in supplying solutions to standard banking requirements. It needs to be noted that there is substantial room to improve the effectiveness of e-banking systems, based on the **Importance** mean score of 6.01 on all variables combined. The Pearson correlation coefficient between **Importance** and **Actual** scores is 0.69, which is a strong positive correlation between the **Importance** and **Actual** performance scores.

Two sub-questions which were formulated are:

- How can "effectiveness" of e-banking systems be quantified in a standardised and understandable manner?
- Can an objective method of measuring effectiveness guide the creators of e-banking solutions, to create outward facing electronic banking systems with an increased probability of acceptance by a wider business audience?

These two sub-questions are also answered satisfactorily. Despite general pessimism and reservations held regarding the measurement of systems effectiveness as described in Chapter 2 by Cameron (2010), it is possible to devise instruments that supply an objective and measurable means to determine the effectiveness of e-banking systems. The tool developed and used in this research made use of two approaches namely, the well-known Technology Acceptance Model which was adapted for use with systems already used for some time, and a relatively old technique which was used to determine effectiveness of information systems thirty years ago, adapted to evaluate more modern externally facing client-oriented electronic banking systems.

The research objectives listed in Chapter 1 were:

- Determine the effectiveness of e-banking systems from the perspective of the end-user, represented by a mix of businesses in South Africa.
- Correlate these effectiveness findings with similar findings obtained from previous research.
- Obtain an understanding of the different methods used to measure effectiveness of systems, particularly considering the reliability and repeatability of each method.

In all three cases, the objectives were satisfied. As described above, an instrument was developed and used, based on previous research, that contained comparative measurement criteria. This instrument was also plied into the TAM methodology, adjusted to cater for the fact that e-banking systems had been in use for many years. **Intent to use** is thus no longer applicable but is replaced with **Intent to continue using**. The findings from this research was compared to previous similar research. This comparison yielded strong positive correlation for all variables measured. An understanding was formed of previous methods used to determine effectiveness of e-business systems. The benefits and shortfalls of each was covered and described in Chapter 2.

6.2 CONTRIBUTION TO THE BODY OF RESEARCH

It is believed that this research study has proven that an objective, measurable and repeatable instrument can be devised to establish the effectiveness and shortcomings of externally facing systems. Although this research concentrated only on e-banking systems, it is believed that the factors measured and scored are of a sufficient generic means, such that these research steps and methodology can be replicated in other industry sectors without compromising any of the quality.

6.3 PRACTICAL CONTRIBUTIONS

The research conducted has a practical application also. It is easy to apply by banks to determine the clients' importance to e-banking systems factors, and to determine in a measurable manner the performance of the systems currently deployed by the bank. The results also indicate several aspects where banks may improve their products, or can identify specific shortcomings for which additional in-depth investigation may identify the root cause of a lower than expected result.

From a client perspective, the client can use the same research structure to measure the performance of the e-banking system they are currently using, and to establish a baseline of performance required from the e-banking system when they consider changing banks.

6.4 FUTURE RESEARCH SUGGESTIONS

Due to the limitations already discussed in this research, a few further research suggestions are proposed:

a. Repeat this research with an acceptable number of responses to verify the conclusions reached with this research. The number of responses was already indicated as a limitation.
b. Using the same research approach, expand the research to other industries and e-business systems in use to determine if the conclusions reached for e-banking applies to other types of e-business systems.
c. Conduct a longitudinal study after five or more years to determine if the **Actual** scoring had improved in relation to the **Importance** scoring as reported in this research.
d. Conduct a longitudinal research study, repeating the research conducted by Miller and Doyle, to determine if the scoring of internal Information Systems had become more positive in comparison to the original study. Also include finding the reasons for increases in satisfaction or effectiveness and determine if this is applicable to this research.
e. Consider executing the same research, but using an alternative, more suitable, methodology instead of TAM.

6.5 CONCLUDING REMARKS

The first concluding remark is that TAM may not have been the most suitable research methodology for this study. However, TAM stood up well in determining the measures on the variables defined, by being flexible enough to adapt to the requirements of different research demands.

A popular saying goes: "***Don't throw out the baby with the bath water!***". Old methodologies and academic studies that were used to research concepts, can still be applied where applicable with great benefit. It may be necessary to adjust and possibly redefine some aspects due to technological changes over time as was done in this research with the work conducted by Miller and Doyle (1987). The end results are worth the effort.

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APPENDIX A - COVER LETTER

UNIVERSITEIT VAN PRETORIA
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YUNIBESITHI YA PRETORIA

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Economic and Management Sciences

Dept. of Informatics

MEASURING THE EFFECTIVENESS OF BANKING E-BUSINESS SYSTEMS IN SOUTH AFRICA

Research conducted by:
Mr. J.M. Peenz (14210968)
Cell: 078 458 1413

Dear Participant

You are invited to participate in an academic research study conducted by Jacobus Peenz, Master in Commerce student from the Department Informatics at the University of Pretoria.

The purpose of the study is to prove a means of measuring the effectiveness of e-business systems in use in South Africa by retailers in various economic sectors. E-business systems include a wide variety of internet-based systems used during the conduct of your daily business. This includes online banking, ordering of stock, submitting various documents to government, paying utility accounts, etc.

Please note the following:

- This is an anonymous study survey. Your name will not appear on the questionnaire. The answers you give will be treated as strictly confidential as you cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any consequences.
- Please answer the questions in the attached questionnaire as completely and honestly as possible. This should not take more than 15 to 20 minutes of your time.
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings upon request.
- Please contact my study leader, Professor C De Villiers, carina.devilliers@up.ac.za / (012) 420-3798 if you have any questions or comments regarding the study.

Please sign the form to indicate that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis.

By participating in this survey, you implicitly permit the researcher to use the information supplied by you in this study.

APPENDIX B - QUESTIONNAIRE

Please describe the type of business you own or manage, e.g. fuel retailer, liquor store, fast-food outlet, restaurant, groceries retailer, etc. (Mandatory to know)

_____

Please indicate the staff complement

1 to 10	10 to 50	50 to 100	100 to 200	More than 200

Kindly provide the province and town where your business resides:

_____

Please indicate the bank with which you interact during your standard business conduct. with an 'X' in the right-hand cell

Standard Bank	
ABSA	
FNB / RMB	
Nedbank	
Other: (name): _____	

If you select not to participate, kindly indicate the reason for non-participation:

_____

If you do participate and wish to receive the result of this survey, please indicate contact detail where a copy of the final report can be e-mailed to:

_____

Irrelevant		Possibly Useful		Important		Critical
1	2	3	4	5	6	7

	Measure	Importance							Actual performance						
1	Availability of information	1	2	3	4	5	6	7	1	2	3	4	5	6	7
2	Volume of information received	1	2	3	4	5	6	7	1	2	3	4	5	6	7
3	Ease of access to e-business system	1	2	3	4	5	6	7	1	2	3	4	5	6	7
4	Ease of retrieving information	1	2	3	4	5	6	7	1	2	3	4	5	6	7
5	Currency of available information	1	2	3	4	5	6	7	1	2	3	4	5	6	7
6	System availability and reliability	1	2	3	4	5	6	7	1	2	3	4	5	6	7
7	Confidence in system	1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	Accuracy of information	1	2	3	4	5	6	7	1	2	3	4	5	6	7
9	Flexibility of information received	1	2	3	4	5	6	7	1	2	3	4	5	6	7
10	Quick and flexible access to information	1	2	3	4	5	6	7	1	2	3	4	5	6	7
11	System security and privacy	1	2	3	4	5	6	7	1	2	3	4	5	6	7
12	Completeness of information	1	2	3	4	5	6	7	1	2	3	4	5	6	7
13	Understanding of e-business system	1	2	3	4	5	6	7	1	2	3	4	5	6	7
14	Relevance of information for intended use	1	2	3	4	5	6	7	1	2	3	4	5	6	7
15	Use of modern look and feel interfaces	1	2	3	4	5	6	7	1	2	3	4	5	6	7
16	Cost-effectiveness to use the system	1	2	3	4	5	6	7	1	2	3	4	5	6	7
17	Availability of models to analyse alternatives	1	2	3	4	5	6	7	1	2	3	4	5	6	7
18	Ability to support decision-making	1	2	3	4	5	6	7	1	2	3	4	5	6	7
19	Quality and competence of bank support staff	1	2	3	4	5	6	7	1	2	3	4	5	6	7
20	Communication from bank staff	1	2	3	4	5	6	7	1	2	3	4	5	6	7
21	Responsiveness to requests for changes	1	2	3	4	5	6	7	1	2	3	4	5	6	7
22	Involvement in future developments	1	2	3	4	5	6	7	1	2	3	4	5	6	7
23	Regularity of new functions and features	1	2	3	4	5	6	7	1	2	3	4	5	6	7
24	Quality and competence of bank technical staff	1	2	3	4	5	6	7	1	2	3	4	5	6	7
25	Effective training in use of e-business systems	1	2	3	4	5	6	7	1	2	3	4	5	6	7
26	E-business system support in own strategic planning	1	2	3	4	5	6	7	1	2	3	4	5	6	7
27	Bank knowledge of your business	1	2	3	4	5	6	7	1	2	3	4	5	6	7
28	Degree of control over which functions and services are received	1	2	3	4	5	6	7	1	2	3	4	5	6	7
29	Your own feelings of "participation"	1	2	3	4	5	6	7	1	2	3	4	5	6	7
30	Banks' positive attitude	1	2	3	4	5	6	7	1	2	3	4	5	6	7
31	E-business systems ability to adapt to your changing needs	1	2	3	4	5	6	7	1	2	3	4	5	6	7
32	Amount of effort to integrate external e-business systems in your own systems	1	2	3	4	5	6	7	1	2	3	4	5	6	7

APPENDIX C - PREVIOUS E-BANKING RESEARCH OUTCOMES

Table 28 - List of Internet Banking Acceptance Research

Reference	Title	Methodology	Sample size	Hypotheses	Findings
(AbuShanab et al., 2010)	Internet banking and customers' acceptance in Jordan: the unified model's perspective	UTAUT	523	H1a: Customers with high performance expectancy will have a greater intention to adopt Internet banking.	Supported
				H1b: Customers with high effort expectancy will have a greater intention to adopt Internet banking.	Supported
				H1c: Customers perceiving high social influence from significant others will have a greater intention to adopt Internet banking.	Supported
				H1d: The influence of performance expectancy will be moderated by gender, such that the effect will be stronger for men; the influence of effort expectancy will be moderated by gender, such that the effect will be stronger for women; and the influence of social influence will be moderated by gender, such that the effect will be stronger for women.	Supported
				H1e: The influence of performance expectancy will be moderated by age, such that the effect will be stronger for younger individuals; the influence of effort expectancy will be moderated by age, such that the	Partial Support

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				effect will be stronger for younger individuals; and the influence of social influence will be moderated by age, such that the effect will be stronger for older individuals.	
				H2a: Perceived facilitating conditions will have a significant positive relationship with behavioural intention to adopt Internet banking.	Not supported
				H2b: Self-efficacy will have a significant positive relationship with behavioural intention to adopt Internet banking.	Supported
				H2c: Anxiety toward using the Internet will have a significant negative relationship with behavioural intention to adopt Internet banking.	Not supported
				H2d: Personal innovativeness will have a significant positive relationship with behavioural intention to adopt Internet banking.	Not supported
				H2e: Perceived trust will have a significant positive relationship with behavioural intention to adopt Internet banking.	Supported
				H2f: Perceived risk will have a significant positive relationship with behavioural intention to adopt Internet	Not supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				banking. H2g: Internal LOC will have a significant positive relationship with behavioural intention to adopt Internet.	 Supported
(Akinci et al., 2004)	Adoption of internet banking among sophisticated consumer segments in an advanced developing country		140	. to understand the demographic characteristics of the users and non-users of IB services in the highly educated market segment; . to describe the preferences for various delivery channels by IB users and non-users; . to compare the attitudes of users and non-users towards IB with respect to a number of factors such as technology, security, convenience, and costs; . to identify the major sub-segments among highly educated IB consumers; and, . to search the similarities between various IB transactions and group these services in homogenous categories.	
(Al-Ajam and Nor, 2013)	Influencing factors on behavioural intention to adopt Internet banking service	TAM	1286	H1: Perceived relative advantage of using Internet banking positively affects the attitude toward using the technology.	Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H2: Perceived ease of use of using Internet banking positively affects the attitude toward using the technology.	Supported
				H3: Perceived compatibility of Internet banking with one's values positively affects attitude toward using the technology.	Supported
				H4: Trialability of Internet banking positively affects attitude toward using the technology.	Supported
				H5: Attitude about Internet banking positively affects the intention to use the technology.	Supported
(Amin, 2009)	An analysis of online banking usage intentions: An extension of the Technology Acceptance Model	TAM	206	H1: Perceived usefulness has a positive effect on consumer acceptance of online banking	Supported
				H2: Perceived ease of use has a positive effect on consumer acceptance of online banking	Supported
				H3: Perceived credibility has a positive effect on consumer acceptance of online banking	Supported
				H4: Perceived enjoyment has a positive effect on consumer acceptance of online banking	Not supported
					Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H5: Social norm has a positive effect on consumer acceptance of online banking	
(Ayo et al., 2010)	The state of e-banking implementation in Nigeria: A post-consolidation review	TAM	369	H1: There is a positive relationship between customers' perceived usefulness of e-banking system and their continued intention to use it. H2: There is a positive relationship between customers' perceived ease of use of e-banking and their continued intention to use it. H3: There is a positive relationship between customers' perceived risk and their continued intention to use the e-banking system. H4: Trusts in e-banking channels have positive relationship with customers' intention to continue using e-banking. H5: There is a positive relationship between customers' perceived organizational reputation and their intention to use e-banking services.	Supported Supported Not supported Supported Supported
(Cheng et al., 2006)	Adoption of internet banking: an empirical study in Hong Kong	TAM	203	H1: Customers' Attitude positively influences their Intention. H2a: Perceived Usefulness has a direct positive relationship with customers' Intention.	Supported Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H2b: Perceived Usefulness has a direct positive relationship with customers' Attitude.	Supported
				H3: Perceived Ease of Use has a direct positive relationship with customers' Attitude.	Not supported
				H4a: Perceived Ease of Use has an indirect positive relationship with customers' Intention via Perceived Usefulness.	Supported
				H4b: Perceived Ease of Use has an indirect positive relationship with customers' Attitude via Perceived Usefulness.	Supported
				H5a: Perceived Web Security has a direct positive relationship with customer's Intention.	Supported
				H5b: Perceived Web Security has a direct positive relationship with customer's Attitude.	Not supported
(Eriksson et al., 2008)	The adoption of commercial innovations in the former Central and Eastern European markets: The case of internet banking in Estonia	Innovation Adoption Theory	1831	H1: If a consumer perceives an Internet bank as offering relative advantage, the consumer will be more willing to use the Internet bank.	Strong influence
				H2: If a consumer perceives Internet banking to be relatively easy to use and understand, the consumer will be more willing to use Internet banking.	Strong influence

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H3: Compatibility will have a positive influence on consumers' use of an Internet bank but will probably be less influential than relative advantage and complexity. H4: Perceived risk will not influence consumers' use of an Internet bank.	Significant, but weak influence Significant, but weak influence
(Ezzi, 2014)	A theoretical Model for Internet banking: beyond perceived usefulness and ease of use	TAM	Theoretical only		**Exclude?**
(Foon and Fah, 2011)	Internet banking adoption in Kuala Lumpur: an application of UTAUT model	UTAUT	200	No hypotheses	**Exclude?**
(Gerrard and Barton Cunningham, 2003)	The diffusion of internet banking among Singapore consumers	Innovation Adoption Theory	240	H1: Adopters and non-adopters differ on the basis of their perceptions of Internet banking. As compared to non-adopters, adopters rate Internet banking as being more convenient (H1a), more accessible (H1b), less risky - in relation to breaches of confidentiality (H1c), more compatible (H1d), requiring a higher level of PC proficiency (H1e), more economical beneficial (H1f), more socially desirable (H1g) and less complex (H1h). H2: Adopters as compared to non-adopters, will be more financially innovative.	H1a: Accepted H1b: Rejected H1c: Rejected H1d: Accepted H1e: Accepted H1f: Rejected Accepted
(Gikandi and Bloor, 2010)	Adoption and effectiveness of electronic banking in Kenya	Not stated	Not stated	Not stated	

Reference	Title	Methodology	Sample size	Hypotheses	Findings
(Hanafizadeh et al., 2014)	A systematic review of Internet banking adoption	Comparative	165 articles	None	**Exclude?**
(Lee, 2009)	Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit	TAM / TPB	368	H1: Perceived usefulness positively influences the intention to use online banking. H2: Attitude positively influences the intention to use online banking. H3: Subjective norm has positively influences the intention to use online banking. H4: Perceived behaviour control positively influences the intention to use online banking. H5: Perceived usefulness positively influences attitudes towards the use of online banking. H6: Perceived ease of use positively influences attitudes towards the use of online banking. H7: Perceived ease of use positively influences the perceived usefulness of the use of online banking. H8a: Performance risk negatively influences the perceived usefulness of using online banking.	Supported Supported Supported Supported Supported Supported Supported Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H8b: Performance risk negatively influences attitudes towards the use of online banking.	Supported
				H9a: Financial risk negatively influences attitudes towards the use of online banking.	Supported
				H9b: Financial risk negatively influences intentions towards the use of online banking.	Not discussed
				H10a: Social risk negatively influences attitudes towards the use of online banking.	Not supported
				H10b: Social risk negatively influences the subjective norm regarding the use of online banking.	Supported
				H11: Time risk negatively influences attitudes towards the use of internet banking.	Supported
				H12a: Security/privacy risk negatively influences attitudes towards the use of online banking.	Supported
				H12b: Security/privacy risk negatively influences intentions to use online banking.	Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H13: Perceived benefit has a positive effect on attitude to use online banking.	Not discussed
				H14: Perceived benefit has a positive effect on intention to use online banking.	Not discussed
(Loonam and O'loughlin, 2008)	Exploring e-service quality: a study of Irish online banking	Qualitative	20 randomly selected	None listed	**Exclude?**
(Martins et al., 2014)	Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application	UTAUT	249	H1: The influence of Performance Expectancy (PE) on Behavioural Intention (BI) will be positive and moderated by age and gender, such that it will be stronger for young and men.	Partially supported
				H2: The influence of Effort Expectancy (EE) on Behavioural Intention (BI) will be positive and moderated by age and gender, such that it will be stronger for young and women.	Partially supported
				H3: The influence of Social Influence (SI) on Behavioural Intention (BI) will be positive and moderated by age and gender, such that it will be stronger for older and women.	Partially supported
				H4: The influence of Facilitating Conditions (FC) on Usage Behaviour (UB) will be positive and moderated by age, such that it will be stronger for older.	Not supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H5: Behavioural Intention (BI) will have a significant positive influence on Usage Behaviour (UB).	Supported
				H6: Perceived Risk (PCR) is a second order factor of seven risks.	Not discussed
				H6a: Perceived Risk (PCR) will positive influence Performance Risk (PFR).	Supported
				H6b: Perceived Risk (PCR) will positive influence Financial Risk (FR).	Supported
				H6c: Perceived Risk (PCR) will positive influence Time Risk (TR).	Supported
				H6d: Perceived Risk (PCR) will positive influence Psychological Risk (PSR).	Supported
				H6e: Perceived Risk (PCR) will positive influence Social Risk (SR).	Supported
				H6f: Perceived Risk (PCR) will positive influence Privacy Risk (PR).	Supported
				H6g: Perceived Risk (PCR) will positive influence Overall Risk (OR).	Supported
				H7: Perceived Risk (PCR) will negative influence Behaviour Intention (BI).	Supported
				H8: Perceived Risk (PCR) will negative influence Performance Expectancy (PE).	Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H9: Effort Expectancy (EE) will negative influence Perceived Risk (PCR).	Supported
(Naimi Baraghani, 2008)	Factors influencing the adoption of internet banking	ETAM + TPB	240	Hypothesis 1: Attitude has positive impact on intention to use Internet banking.	Supported
				Hypothesis 2: Perceived behaviour control positively influences intention to use Internet banking.	Not supported
				Hypothesis 3: Subjective norm has positive effect on intention to use Internet banking.	Supported
				Hypothesis 4: Trust has positive effect on attitude to use Internet banking.	Supported
				Hypothesis 5: Trust has positive impact on perceived behaviour control to use Internet banking.	Supported
				Hypothesis 6: Trust positively influences subjective norm to Internet banking.	Supported
				Hypothesis 7: Trust has positive effect on intention to use Internet banking.	Supported
				Hypothesis 8: Trust has positive effect on PU to use Internet banking.	Supported
				Hypothesis 9: PEOU has positive impact on PU to use Internet banking.	Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				Hypothesis 10: PEOU positively influences trust in using Internet banking.	Supported
				Hypothesis 11: PEOU positively influences attitude to use Internet banking.	Supported
				Hypothesis 12: PU has positive impact on attitude to use Internet banking.	Supported
				Hypothesis 13: PU has positive effect on intention to use Internet banking.	Supported
(Pikkarainen et al., 2004)	Consumer acceptance of online banking: an extension of the technology acceptance model	ETAM	268	H1. Perceived usefulness (PU) has a positive effect on consumer acceptance of online banking	Supported
				H2. Perceived ease of use (PEOU) has a positive effect on consumer acceptance of online banking	Not supported
				H3. Perceived enjoyment (PE) has a positive effect on consumer acceptance of online banking	Not supported
				H4. The amount of information a consumer has about online banking has a positive effect on consumer acceptance of online banking	Supported
				H5. Security and privacy have a positive effect on consumer acceptance of online banking	Not supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H6. The quality of the Internet connection has a positive effect on consumer acceptance of online banking	Not supported
(Polasik and Piotr Wisniewski, 2009)	Empirical analysis of internet banking adoption in Poland	Binomial Logistic Regression	3519	H1: The higher the individually perceived security of Internet transactions, the higher the probability of using online banking services. H2: Familiarity with the Internet medium, as measured by the duration of past usage, application of Internet at work and prior experience with online transactions, will have a positive effect on the usage of Web-based banking. H3: Exposure to online banking advertisements increases the likelihood of Internet banking adoption. H4: Use of other banking products, such as mobile phone banking, as well as debit, credit and virtual cards raises the odds that a respondent opens an online account. H5: Access to broadband Internet connection increases the probability of using Internet banking. H6: Demographic characteristics, such as age, gender, income, education, place of residence and work-related attributes jointly determine the adoption status.	Supported Supported Supported Supported Supported Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
(Shon and Swatman, 1998)	Identifying effectiveness criteria for Internet payment systems	Delphi	14	No stated hypothesis	**Exclude?**
(Tan et al., 2010)	The adoption of online banking in Malaysia: an empirical analysis	TAM	231	H1: Perceived usefulness of online banking services will have a positive effect on online banking services use in Malaysia. H2: Perceived ease of use has a positive effect on online banking services use in Malaysia. H3: Perceived security risk will have a positive effect on online banking services use in Malaysia. H4: Social Influence has a positive effect on online banking services use in Malaysia. H5: Perceived financial cost will have negative effect on online banking services use in Malaysia. H6: Consumer trust in online banking will have a positive effect on online banking services use in Malaysia.	True True Rejected True Rejected True
(Tan and Teo, 2000)	Factors influencing the adoption of Internet banking	DTPB / diffusion of innovations theory	454	H1A: The greater the perceived relative advantage of using Internet banking services, the more likely that Internet banking will be adopted. H1B: The greater the perceived compatibility of Internet banking with	Supported Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				one's values, the more likely that Internet banking will be adopted.	
				H1C: The greater the experience with using the Internet, the more likely that Internet banking will be adopted.	Supported
				H1D: The greater the use of banking products and services, the more likely that Internet banking will be adopted.	Supported
				H1E: The lower the perceived complexity of using Internet banking, the more likely that Internet banking will be adopted.	Not supported
				H1F: The greater the trial-ability of Internet banking, the more likely that Internet banking will be adopted.	Supported
				H1G: The lower the perceived risk of using Internet banking, the more likely that Internet banking will be adopted.	Supported
				H2: The beliefs associated with subjective norms are significantly related to an individual's intention to adopt Internet banking.	Not supported
				H3A: The greater the self-efficacy toward using Internet banking, the more likely that Internet banking will be adopted.	Supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H3B: The greater the extent of perceived technological support for Internet banking, the more likely that Internet banking will be adopted. H3C: The greater the extent of perceived government support for electronic commerce, the more likely that Internet banking will be adopted.	Not supported Supported
(Tat and Nor, 2015)	Predictors of intention to continue using internet banking services: An empirical study of current users			No hypotheses	**Exclude?**
(Xue et al., 2011)	Determinants and outcomes of internet banking adoption	RUM	28,945	Hypothesis 1 (H1): Higher transaction volume is associated with faster Internet banking adoption. Hypothesis 2a (H2a): A lower density of offline channels (branches and ATMs) near the customer is associated with faster Internet banking adoption. Hypothesis 2b (H2b): The effect of offline channel density on Internet banking adoption is larger (in absolute value) for customers with higher income. Hypotheses 3a (H3a): Higher customer efficiency is associated with faster Internet banking adoption. Hypotheses 3b (H3b): The rate that Internet banking adoption increases	Supported Not supported Not supported Supported Not supported

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				with service demand is increasing in customer efficiency.	
				Hypothesis 4 (H4): Higher local penetration is associated with faster adoption of Internet banking (after suitably controlling for geographic and time-series heterogeneity).	Supported
				Hypothesis 5(H5): Internet banking adoption is associated with increasing product acquisition from the bank.	Supported
				Hypothesis 6a (H6a): Internet banking adoption is associated with increased total transaction activity.	Supported
				Hypothesis 6b (H6b): Internet banking adoption is associated with decreased usage of other channels.	Not supported
				Hypothesis 7 (H7): Internet banking adoption is associated with an increase in a customer's profitability.	Not supported
				Hypothesis 8 (H8): Internet banking adoption is associated with lower likelihood of customer departure from the bank.	Supported
				Hypothesis 9 (H9): Adoption correlates that are likely to affect cross-sell potential (local penetration, branch density and service demand) are	Partial support

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				associated with greater product use after online banking adoption. Hypothesis 10 (H10): Adoption correlates that increase channel substitution (service demand and customer efficiency) are associated with less usage of non-Internet channels and greater profits after online banking adoption.	Partial support
(Yeow et al., 2008)	User acceptance of online banking service in Australia	UTAUT	190	No hypotheses	**Excluded due to predatory publisher**
(Yu, 2012)	Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model	UTAUT	441	H1: Performance expectance significantly affects individual intention to use mobile banking. H2: Effort expectation significantly affects individual intention to use mobile banking. H3: Social influence significantly affects individual intention to use mobile banking. H4: Perceived credibility significantly affects individual intention to use mobile banking. H5: Perceived financial cost significantly affects individual intention to use mobile banking.	No hypotheses findings. Summarised by several categories.

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H6: Facilitating conditions significantly affect individual behaviour of using mobile banking. H7: Perceived self-efficacy significantly affects individual behaviour of using mobile banking. H8: Behavioural intention significantly affects individual behaviour of using mobile banking. H9: The influence of performance expectance on individual intention will be moderated by age. H10: The influence of effort expectance on individual intention will be moderated by age. H11: The influence of social influence on individual intention will be moderated by age. H12: The influence of perceived credibility on individual intention will be moderated by age. H13: The influence of facilitating conditions on individual behaviour will be moderated by age.	

Reference	Title	Methodology	Sample size	Hypotheses	Findings
				H14: The influence of perceived self-efficacy on individual behaviour will be moderated by age. H15: The influence of performance expectance on individual intention will be moderated by gender. H16: The influence of effort expectance on individual intention will be moderated by gender. H17: The influence of social influence on individual intention will be moderated by gender. H18: The influence of perceived credibility on individual intention will be moderated by gender. H19: The influence of facilitating conditions on individual behaviour will be moderated by gender. H20: The influence of perceived self-efficacy on individual behaviour will be moderated by gender.	

APPENDIX D –RIGOUR AND CREDIBILITY INSPECTION OF SELECTED ARTICLES

Table 29 - Rigour and Credibility Inspection of Articles Selected

	Reference	Journal	Title	Search Source	Research Methodology	Sample size	Publisher
1	(AbuShanab et al., 2010)	Communications of the Association for Information Systems	Internet banking and customers' acceptance in Jordan: the unified model's perspective	UP	UTAUT	523	Emerald
2	(Akinci et al., 2004)	International journal of bank marketing	Adoption of internet banking among sophisticated consumer segments in an advanced developing country	UP		140	Emerald
†3	(Al-Ajam and Nor, 2013)	World Applied Sciences Journal	Influencing factors on behavioural intention to adopt Internet banking service	Google Scholar	TAM	1286	IDOSI Publications
4	(Amin, 2009)	International Journal of Business & Society	AN ANALYSIS OF ONLINE BANKING USAGE INTENTIONS: AN EXTENSION OF THE TECHNOLOGY ACCEPTANCE MODEL	UP	TAM	206	ProQuest
5	(Ayo et al., 2010)	Journal of emerging trends in economics and management sciences	The state of e-banking implementation in Nigeria: A post-consolidation review	UP	TAM	369	Sabinet
6	(Cheng et al., 2006)	Decision Support Systems	Adoption of internet banking: an empirical study in Hong Kong	UP	TAM	203	Elsevier
7	(Eriksson et al., 2008)	International Journal of Bank Marketing	The adoption of commercial innovations in the former Central and Eastern European markets: The case of internet banking in Estonia	UP	Innovation Adoption Theory	1831	Emerald

	Reference	Journal	Title	Search Source	Research Methodology	Sample size	Publisher
8	(Ezzi, 2014)	Archives of Business Research	A theoretical Model for Internet banking: beyond perceived usefulness and ease of use	Google Scholar	TAM	Theoretical only	Society for Science and Education, United Kingdom
†9	(Foon and Fah, 2011)	International Journal of Business and Management	Internet banking adoption in Kuala Lumpur: an application of UTAUT model	Google Scholar	UTAUT	200	ResearchGate
10	(Gerrard and Barton Cunningham, 2003)	International journal of bank marketing	The diffusion of internet banking among Singapore consumers	UP	Innovation Adoption Theory	240	Emerald
11	(Gikandi and Bloor, 2010)	Electronic commerce research and applications	Adoption and effectiveness of electronic banking in Kenya	UP	Not stated	Not stated	Elsevier
12	(Hanafizadeh et al., 2014)	Telematics and informatics	A systematic review of Internet banking adoption	UP		165 articles	Elsevier
13	(Lee, 2009)	Electronic commerce research and applications	Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit	UP	TAM / TPB	368	Elsevier
14	(Loonam and O'loughlin, 2008)	Marketing Intelligence & Planning	Exploring e-service quality: a study of Irish online banking	UP		20 randomly selected	Elsevier
15	(Martins et al., 2014)	International Journal of Information Management	Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application	UP	UTAUT	249	Elsevier
16	(Naimi Baraghani, 2008)	Lulea University of Technology	Factors influencing the adoption of internet banking	Academia .edu	ETAM + TPB	240	Lulea University of Technology

	Reference	Journal	Title	Search Source	Research Methodology	Sample size	Publisher
17	(Pikkarainen et al., 2004)	Internet research	Consumer acceptance of online banking: an extension of the technology acceptance model	UP	ETAM	268	Emerald
18	(Polasik and Piotr Wisniewski, 2009)	International Journal of Bank Marketing	Empirical analysis of internet banking adoption in Poland	UP	Binomial Logistic Regression	3519	Emerald
19	(Shon and Swatman, 1998)	Internet Research	Identifying effectiveness criteria for Internet payment systems	UP	Delphi	14	Emerald
20	(Tan et al., 2010)	International Journal of Business and Management Science	The adoption of online banking in Malaysia: an empirical analysis	UP	TAM	231	ProQuest
21	(Tan and Teo, 2000)	Journal of the AIS	Factors influencing the adoption of Internet banking	Google Scholar	DTPB / diffusion of innovations theory	454	ACM DL
22	(Tat and Nor, 2015)	International Journal of Business and Information	Predictors of intention to continue using internet banking services: An empirical study of current users				
23	(Xue et al., 2011)	Management science	Determinants and outcomes of internet banking adoption	UP	RUM	28,945	EBSCOHost
†24	(Yeow et al., 2008)	Communications of the IBIMA	User acceptance of online banking service in Australia	Google Scholar	UTAUT	190	IBIMA
25	(Yu, 2012)	Journal of Electronic Commerce Research	Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model	UP	UTAUT	441	ProQuest

	Reference	Journal	Title	Search Source	Research Methodology	Sample size	Publisher
26	(Sabharwal, 2016)	International Journal of Computer Applications	The Assessment of Concerns, Opinions and Perceptions of Bank Customers to find the Significant Metrics for Deployment of Biometrics in E-Banking	UP			ProQuest
27	(Mujinga et al., 2016)	IST-Africa Week Conference, 2016	Online banking users' perceptions in South Africa: An exploratory empirical study	Google Scholar	None		International Information Management Centre
28	(Maduku, 2013)	Southern African Business Review	Predicting retail banking customers' attitude towards Internet banking services in South Africa	UP	TAM	394	Sabinet
29	(Masocha et al., 2011)	African Journal of Business Management	E-banking adoption by customers in the rural milieus of South Africa: A case of Alice, Eastern Cape, South Africa	Google Scholar	None		Academic Journals
†30	(Chigamba and Fatoki, 2011)	International Journal of Business and Management	Factors influencing the choice of commercial banks by university students in South Africa	Google Scholar	Theory of Constraints		Canadian Centre of Science and Education
31	(Porteous, 2006)		The enabling environment for mobile banking in Africa	Google Scholar	Market Research Document		Department for International Development, United Kingdom
32	(Sehgal, 2017)	Indian Journal of Commerce & Management Studies	A STUDY OF INTERNET BANKING SERVICE QUALITY AND CUSTOMER SATISFACTION OF PRIVATE SECTOR BANKS IN NORTHERN INDIA	Google Scholar		250	Educational Research Multimedia & Publications

	Reference	Journal	Title	Search Source	Research Methodology	Sample size	Publisher
33	(Rahi et al., 2017)	The Journal of Internet Banking and Commerce	Measuring the role of website design, assurance, customer service and brand image towards customer loyalty and intention to adopt internet banking	Google Scholar	UTAUT	500	
34	(Ozlen and Djedovic, 2017)	Journal of Accounting and Management Information Systems	Online banking acceptance: The influence of perceived system security on perceived system quality	UP	UTAUT	120	The Central and Eastern European Online Library
35	(Mou et al., 2017)	Electronic Commerce Research	Trust and risk in consumer acceptance of e-services	UP	Meta-analysis		SpringerLink
†36	(Massilaman y and Nadarajan, 2017)	International Journal of Business and Management	Factors That Influencing Adoption of Internet Banking in Malaysia	Google Scholar		200	Canadian Center of Science and Education
†37	(Marwaha, 2017)	Imperial Journal of Interdisciplinary Research	E-Banking in Himachal Pradesh and its Impact on Job Satisfaction	Google Scholar		100	Imperial Journals
38	(Maruping et al., 2017)	Journal of the Association for Information Science and Technology	Going beyond intention: Integrating behavioral expectation into the unified theory of acceptance and use of technology	UP	UTAUT	720	Wiley Online Library
39	(Low et al., 2017)	The Journal of Internet Banking and Commerce	Users' Loyalty towards Mobile Banking in Malaysia	Google Scholar	TAM	261	www.icommercecentral.com

†Articles shown in red in the table above were found to have been published in journals believed to be predatory publications. They were therefore excluded from use in this research paper.

APPENDIX E – ETHICAL CLEARANCE

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

RESEARCH ETHICS COMMITTEE

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NIVERSITEIT VAN PRETORIA
NIVERSITY OF PRETORIA
UNIBESITHI YA PRETORIA

Faculty of Economic and Management Sciences

13 September 2016

Strictly confidential

Prof C de Villiers
Department of Informatics

Dear Professor de Villiers

Project:	Measuring the effectiveness of e-business systems used by retailers in South Africa
Researcher:	JM Peenz
Student No:	14210968
Supervisor:	Prof C de Villiers
Department:	Informatics

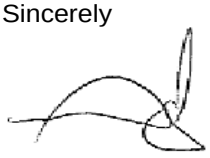
Thank you for submitting the information requested in our letter dated 25 August 2016. I have pleasure in informing you that, after reviewing the information and documents submitted, the above study was approved on an *ad hoc* basis on 12 September 2016. The approval is subject to the candidate abiding by the principles and parameters set out in the application and research proposal in the actual execution of the research.

The approval does not imply that the researcher, student or lecturer is relieved of any accountability in terms of the Codes of Research Ethics of the University of Pretoria if action is taken beyond the approved proposal.

The Committee requests that you convey this approval to the researcher.

We wish you success with the project.

Sincerely



pp PROF RS RENSBURG
CHAIR: COMMITTEE FOR RESEARCH ETHICS

cc: Student Administration