Evaluating the success of a mobile commerce application in streamlining customer self-services

by

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ABSTRACT

This study evaluated the success of a mobile application of a South African telecommunications company. Six dimensions (System Quality, Information Quality, Service Quality, System Use, User Satisfaction, and Net Benefits) were examined to evaluate the mobile application. Quantitative data were collected from 168 respondents using an online survey. Hypothesis testing was carried out using partial least squares structural equation modelling (PLS-SEM). All nine hypotheses tested were supported. The results of data analysis indicated that the factors that inform successful deployment of a mobile application are System Quality, Information Quality, Service Quality, System Use, User Satisfaction, and Net Benefits. The study contributes to the body of knowledge in the area of information system evaluation, particularly in the mobile commerce applications context. The results of this study are valuable in identifying factors that mobile application developers and designers need to focus on in order to produce applications that deliver a return on investments. This will help in ensuring that developed mobile applications add value to the organisation's customers, which is the practical contribution of the study.

Keywords: Mobile Applications; Mobile Apps; IS Evaluation; DeLone and McLean IS Model; e-Commerce; Mobile Commerce; Self-Service

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LIST OF ACRONYMS AND ABBREVIATIONS

AVE   Average Variance Extracted

BI   Business Intelligence

BIS   Business Intelligence System

BSC   Balanced Scorecard

DOI   Diffusion of Innovation

ERP   Enterprise Resource Planning

EUCE   End-User Computing Effectiveness

FAST   Framework for the Application of System Thinking

HIS   Health Information System

IQ   Information Quality

IS   Information System

IT   Information Technology

NB   Net Benefits

PEoU   Perceived Ease of Use

PLS   Partial Least Squares

PU   Perceived Usefulness

ROI   Return on Investment

SD   Service-Dominant

SEM   Structural Equation Modelling

SPSS   Statistical Package for the Social Sciences

SQ   System Quality

SU   System Use

SVQ   Service Quality

TAM   Technology Acceptance Model

US   User Satisfaction

UTAUT   Unified Theory of Acceptance and Use of Technology

DEFINITION OF KEY CONCEPTS

Mobile applications are software applications that can be downloaded to run on mobile devices, such as smartphones in order to perform specific functions (Modiba, 2015; Mtimkulu, 2014; Summerfield, 2016).

Mobile commerce refers to a form of commerce that relates to any business transaction performed using mobile applications (apps) on a mobile device (Yassierli, Vinsensius, & Mohamed, 2019).

Mobile commerce applications are mobile apps that can be accessed by customers via mobile devices to perform mobile commerce (Al-Adwan, Alrousan, Al-Soud, & Al-Yaseen, 2019).

Information Quality refers to the desirable characteristics of an information system's output that provide accurate, current, complete, concise, personalised, relevant, secure, understandable, usable, timely, up- to-date, and well formatted information and content to the system users (DeLone & McLean, 2003).

Net Benefit refers to the extent to which an information system adds value to its users or organisation (DeLone & McLean, 2003).

Service Quality refers to the quality of service or support that system users receive from the system and the provider of a system on issues reported about the system, or its technical competency (DeLone & McLean, 2003).

System Quality refers to the necessary characteristics of an information system in terms of its response time, ease of use, flexibility, ease of learning, availability, visual appearance, interface design, reliability, usability, and adaptability (DeLone & McLean, 2003).

System Use refers to the actual utilisation of an information system, as well as how much its intended users use the system (DeLone & McLean, 2003).

User Satisfaction refers to the level of satisfaction that one experiences after using an information system (DeLone & McLean, 2003).

Success refers to the achievement of desired goals or objectives (Schwartz, 2012; Ryan & Deci, 2000)

Chapter 1.   Introduction

1.1 Background and Problem Statement

Advances in mobile technology are accelerating the developmental rate of new mobile applications designed to satisfy the day-to-day demands of people's social and business life. Yet, despite the geometric growth in the adoption of mobile applications, the revenue generated, and the business opportunities that mobile applications provide, the factors that lead to the widespread deployment of a mobile application are not clearly understood neither by businesses nor by their customers (Bhullar & Gill, 2019; Paramartha, Santoso & Putra, 2021; Yoo, 2020).

According to Lakhani (2020), barely one percent of mobile applications ever succeed, with many applications generally never being downloaded from app stores. As for those that get downloaded by users, many are minimally used before deletion. Legner, Nolte and Nils (2011) stated that the seemingly low business success of mobile applications in the app stores indicates an excessive loss to business investments. It has been acknowledged that not all investments within information technology (IT) result in successful adoption, therefore it is of prime importance to academically evaluate the success of mobile applications that organisations fund (Mkinga & Mandari, 2020; Ojo, 2017). In this regard, DeLone and McLean (2003) indicated that "the measurement of information systems (IS) success or effectiveness is critical to our understanding of the value and efficacy of IS management actions and IS investments" (DeLone & McLean, 2003, p. 10).

Studying the available literature revealed that the success of mobile applications can be evaluated by examining various factors in an information system. The factors for evaluating the success of an information system were identified as: System Quality, Information Quality, Service Quality, System Use/Intention To Use, User Satisfaction, and Net Benefits (Dari & Prahartiwi, 2020; DeLone & McLean, 2003; Shabila & Djamaludin, 2022; Yassierli et al., 2019), Perceived Ease of Use, Perceived Usefulness (Al-Naimat, Al Nuaimi, & Almuiet, 2020; Bhullar & Gill, 2019; Susanti & Mauritsius, 2022), Continued Interest; Social Norms (Malada, 2022), Continuance Intention, Social Influence (Kurt, Aktas, & Turan, 2022; Nani & Lina, 2022), Reliability, User Experience (Nani & Lina, 2022), Trust (Susanti & Mauritsius, 2022), Brand Awareness, Stickiness, Enthusiasm,

Participation, Social Interaction (Paramartha et al., 2021), and Performance (Isnaeningsih, Fitriati, Pujiharto & Astuti, 2021).

The above factors for evaluating the success of an information system are components of many information systems theories. These theories include of the technology acceptance model (Davis, 1989), the DeLone and McLean information system success model (DeLone & McLean, 2003), the unified theory of acceptance and use of technology (Venkatesh, Morris, Davis, & Davis, 2003), and the diffusion of innovation (Rogers, 1995), just to list some of the common ones.

The DeLone and McLean's information system success model (hereafter referred to as the IS success model) is the most popular and validated amid the aforementioned models (Elsdaig & Nassar, 2019; Nugraheni & Bayastura, 2021). It has been applied in several research studies and the literature appraisses the advantages of using it (Elsdaig & Nassar, 2019; Nugraheni & Bayastura, 2021; Wang, Wang, Lin, & Tsai, 2019).

This study adopted the DeLone and McLean IS success model's six dimensions: System Quality, Information Quality, Service Quality, System Use, User Satisfaction, and Net Benefits. The six factors were adopted to evaluate the success of a mobile application for one of the top four telecommunications companies in South Africa. The company provides wired telephony services such as a public switched telephone network (commonly known as PSTN), asymmetric digital subscriber line (commonly known as ADSL), fibre, and internet connectivity services. The company also provides mobile telephony services, such as mobile devices, mobile voice, and mobile data bundles.

The mobile application under investigation allows customers to manage their business transactions. According to the company[1] website, the mobile application provides customers with services such as account payment, data checking and airtime credit balances, credit top-ups, order tracking, fault logging, and help with troubleshooting issues experienced with the company's products and services.

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[1] The name of the company cannot be disclosed, as a condition of the permission they gave to conduct the research. See Appendix B.

Therefore, it was considered valuable to evaluate the success of the company's mobile application in streamlining customer self-services using the DeLone and McLean IS success model (DeLone & McLean, 2003). The outcomes of this study are important in pinpointing the factors that developers and designers must focus on during the development of mobile applications so as to ensure a good return on investments.

1.2 Aim and Objectives of the study

The aim of this study was to evaluate the success of a mobile commerce application in streamlining customer self-services.

With the above aim in mind, the objectives of this study were:

- To identify the factors that inform the success of a mobile application.
- To examine the factors that inform the success of a mobile application.
- To analyse the relationships between the factors that inform the success of a mobile application.

1.3 Research Questions

The following research questions were asked concerning the evaluation of the success of a mobile application:

- How can we evaluate the success of a mobile commerce application in streamlining customer self-services?
- What are the factors that inform the success of a mobile application?
- What is the nature of the relationships between the factors that inform the success of a mobile application?

1.4 Research Methodology

This study adapted the research onion model (Saunders, Lewis, & Thornhill, 2019) to guide its research strategy, design, data collection, and data analysis. It is a positivist study that collected quantitative data using an online survey. Participants were invited to take part in the study by email correspondence and participation was voluntary. The targeted respondents were users of the mobile application under study, aged between 18 and 65 years. A total of 300 questionnaires were distributed and 178 participants responded. However, only 168 responses were comprehensive and useful.

Quantitative methods were used to analyse the relationships amongst the factors identified to be informing the success of a mobile application.

The data were analysed using the IBM Statistical Package for the Social Sciences (SPSS) version 28 and SmartPLS version 4 software packages. The data were checked for nomality before reliability and validity were tested. Partial least squares structural equation modelling (PLS-SEM) was used for hypothesis testing.

1.5 Limitation of the study

The study was conducted on a mobile commerce application that enables customers to perform specific business commercial activities, therefore the findings may not be generalisable to other types of mobile applications.

Collecting data using an online survey meant that the researcher could not provide any guidance to the respondents. For example, in cases where the respondents might not have correctly interpreted the data collection instrument, nor the meaning of the factors under enquiry. Although a pilot study was carried out before the distribution of the data collection tool to guard against this phenomenon, it was still probable that some respondents would answer the questionnaire according to their own subjective understanding of it.

Another point to consider is that the researcher collected data during Covid-19, which restricted the data collection options. This meant that the researcher could not print and hand-deliver the questionnaire to potential respondents who may have preferred to answer the questionnaire manually.

1.6 Significance of the study

This study contributes to the body of knowledge in the area of information systems evaluation. Its contextual framework places a particular emphasis on mobile commerce applications. The knowledge gained from this study will assist other researchers to better understand possible reasons for the high failure rate of mobile application deployments.

Furthermore, this study aims to assist mobile application developers and designers to distinguish which key factors to focus on when developing mobile applications for their organisations.

Consequently, being aware of how to properly evaluate the success of their mobile applications will enable mobile application providers to deploy their mobile application successfully. As a result, the study envisages that this could lead to an increase in the successful development of quality mobile applications that attract and benefit customers. This is the practical contribution of the study.

1.7 Study Outline

The study is outlined as presented in Figure 1.1.

Chapter 1 — Study Overview
Provides an introduction to the study, the problem statement, research aims and objectives, hypotheses, methodological approach (strengths and limitations) as well as the significance of the study

Chapter 2 — Literature Review
Provides a literature review and an analysis of the conceptual model

Chapter 3 — Research Methodology
Addresses the research methodology which was implemented to respond to the research questions

Chapter 4 — Data Analysis and Results
Deals with the analysis of collected data and presents the results achieved during the study

Chapter 5 — Discussion and Findings
Discusses research findings, provides recommendations, discusses limitations, suggests future research projects and offers an overall concluson of the study

FIGURE 1.1:STUDY OUTLINE

1.8 Summary of the chapter

This chapter introduced the study and provided its problem statement. Additionally, the research aim and objectives were outlined, followed by the research questions. A high-level description of the research methodology was provided, followed by the study's limitations and significance.

The following chapter presents the literature review of this study.

Chapter 2.   Literature Review

2.1 Introduction

The aim of this literature analysis was to find and analyse factors that can be used to evaluate the success of a mobile application in streamlining customer self-services. A systematic literature analysis approach was followed, and this study adopted the Okoli and Schabram (2010) model. The following section briefly presents the literature review model.

2.2 Literature Review Method

The adopted four-stage, eight-step systematic literature review model (Okoli & Schabram, 2010) is presented in Figure 2.1. The four stages are:

- **Planning** – when the researcher outlines the purpose of the literature review, and the training and protocol;
- **Selection** – when the researcher searches the literature and performs practical screening;
- **Extraction** – when the researcher does the quality appraisal and data extraction; and
- **Execution** – when the researcher analyses the findings and writes the literature review (Okoli & Schabram, 2010).
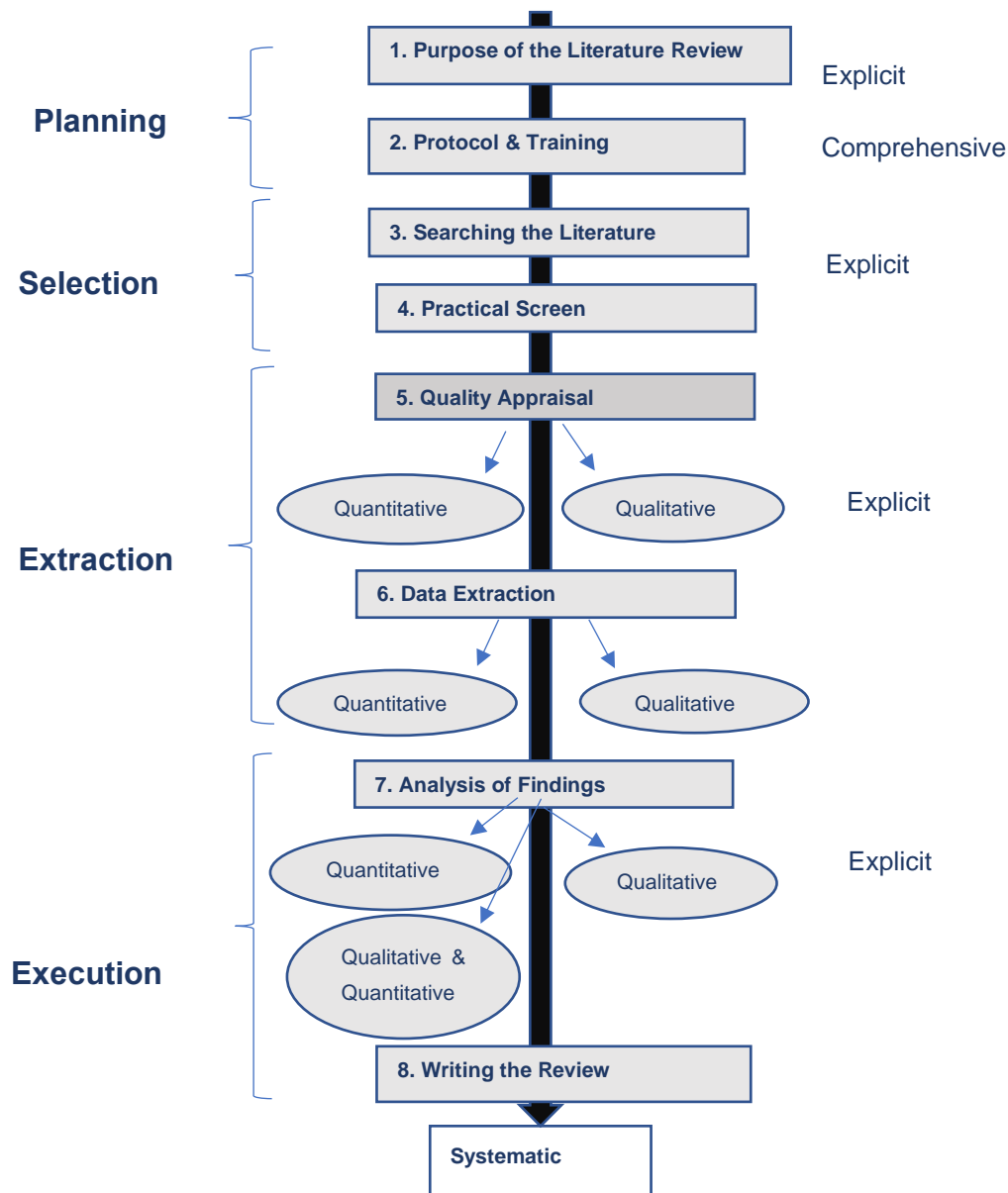
FIGURE 2.1: SYSTEMATIC LITERATURE REVIEW GUIDE

Source: Okoli & Schabram, 2010, p. 9

In the planning stage, the researcher outlined the purpose of the literature review as stated in the introduction of this chapter. The researcher then developed a review protocol that included identifying the keywords to be used to search for relevant studies, and the number of years for which those selected studies would be considered (i.e., the previous five years). Thereafter, the researcher downloaded Mendeley Desktop reference and document management software, and set up subfolders in the tool in which retrieved studies were stored. The subfolders were named after the search keyword used to find the studies. Lastly, the researcher developed a Microsoft Excel template to save information extracted from relevant studies.

In the selection stage, previous studies were found by searching Google Scholar and the Unisa Library Catalogue using keywords such as Analyse, Assess, Describe, Determine, Evaluate, Examine, Explain, Explore, Identify, Illustrate, Investigate, Measure, Understand IS Success, IS Evaluation Models, IS Evaluation Theories, Mobile Applications, Mobile Apps, and Mobile Commerce. More than 250 articles from about 50 publications and journals were retrieved for further reading. The articles that were retrieved were briefly assessed for inclusion in line with the "analysis for inclusion" (Okoli & Schabram, 2010, p. 7) step of the systematic literature review process by reading their abstracts. Studies that analysed, assessed, determined, evaluated, examined, investigated, or measured IS/IT systems adoption, effectiveness, or success in the past five years were considered for further reading and analysis. Articles that met the selection criteria were stored in Mendeley for critical analysis.

In the extraction stage, quality appraisal was performed by reading the introduction, methodology, findings, and conclusion sections of each study that met the inclusion criteria above, before being placed in a subfolder called 'relevant' or 'not relevant'. Studies that were deemed relevant were studies that tested relationships amongst factors from various IS theories used to analyse, assess, determine, evaluate, examine, investigate, or measure adoption, effectiveness, or success of mobile applications, mobile commerce applications, e-commerce, websites, electronic, and traditional information systems. Studies that were not considered relevant were placed in the 'not relevant' sub-folders and were not read further. Out of the 253 studies retrieved, 55 (22%) were placed under the relevant subfolders, whilst 198 (78%) were placed under the not relevant subfolders. Studies that were placed in the relevant subfolder were then read in full, to extract and synthesise relevant data that informed this literature review.

In the execution stage, synthesis was done by extracting data (such as author, year of publication, abstract, introduction, type of system studied, grounding theory, factors investigated, data analysis instruments, and findings) from each relevant study and adding them into the template developed during planning, for final analysis. The written literature review is presented in the following subsections.

2.3 Literature Analysis Results

The results of the literature analysis of the 55 studies are summarised in Table 2.1. The table presents previous studies that were deemed to be related to this study, because they evaluated the success of different types of information systems. The studies focused on information systems such as web-based, electronic, mobile applications, and traditional information systems, that were studied within the last five years. The table's eight columns list the author/s, study aim, information system type, research approach, study location, theoretical framework, data analysis method, and study findings of the 55 studies.

TABLE 2.1: LITERATURE REVIEW RESULTS

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
1.	Al-Mamary, Al-Nashmi, Shamsuddin, & Abdulrab, 2019	To develop an integrated model for the adoption of management information systems in telecommunication organisations To determine the impact of technological, organisational, and people factors on Perceived Usefulness and User Satisfaction towards enhancing the individual's performance	Management Information Systems	Survey of 382 respondents	Yemen	DeLone & McLean IS success model; technology acceptance model (TAM); TAM 2; TAM 3; end-user computing effectiveness model (EUCE); combined TAM and theory of planned behaviour (C-TAM-TPB) model; motivational model (MM)	Structural Equation Modelling (SEM)	The study findings showed that System Quality, Information Quality, Computer Self-efficacy, and Computer Experience affected Perceived Usefulness. System Quality, Information Quality, User Training. Computer Experience and Perceived Usefulness affected User Satisfaction. Perceived Usefulness affected individual performance.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
2.	Angelina, Hermawan, & Suroso, 2019	To analyse the relationship of System Quality, Information Quality, and Service Quality to User Satisfaction and Use, and the relationship of User Satisfaction and Use to Net Benefits	Electronic Commerce System	Survey of 110 respondents	Indonesia	DeLone & McLean IS success model	SEM	The study found no significant effect of System Quality on System Use, across all three applications. On the other hand, the study found that System Quality had a significant effect on User Satisfaction, across all three applications. The study also found a positive effect of Service Quality on both System Use and User Satisfaction, across all three applications. Information Quality had an insignificant effect on Use, across all three applications.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
3.	Ebnehoseini, Tabesh, Deldar, Mostafavi, & Tara, 2019	To develop an instrument to measure health information system success rate based on users' viewpoints in a teaching hospital	Health Information System	Survey of 125 users	Iran	DeLone & McLean IS success model	Correlation	The results showed that Usefulness, then System Quality, and then Net Benefits showed the highest rates of success.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
4.	Elsdaig & Nassar, 2019	To evaluate System Quality, Information Quality, and Service Quality to determine the quality of a patient care system	Health Information System	Survey of health stakeholders in four hospitals	Saudi Arabia	DeLone & McLean IS success model	Regression Analysis	The study found that System Quality had a positive effect on System Use, and on User Satisfaction. Information Quality had a positive effect on both System Use and User Satisfaction. Service Quality had a positive effect on both System Use and User Satisfaction. System Use had a positive effect on both User Satisfaction and Net Benefits. User Satisfaction had a positive effect on Net Benefits.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
5.	Fitriani, Hidayanto, Sandhyaduhita, Purwandari, & Kosandi, 2019	To identify the determinants of user continuance intentions to use an open data website	Open Data Website	Survey of 513 respondents	Indonesia	Theory of planned behavior; technology quality and trust factors	SEM	The study results showed that Attitude, Subjective Norm, Perceived Behavioural Control, and Trust directly affected Continuance Intention to Use the open data website. System Quality was found to affect Perceived Ease of Use. Information Quality was found to positively affect Perceived Usefulness, Perceived Ease of Use, and Trust. Perceived Usefulness, and Perceived Ease of Use were found to affect a user's attitude.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
6.	Jusuf, Legowo, Samiaji, & Sundari, 2019	To evaluate an information system success model for a sales management application	Sales Management Application	Survey of 360 respondents	Indonesia	DeLone & McLean IS success model; TAM; trust	Partial Least Squares (PLS)	The study results showed that Service Quality had no effect on Perceived Usefulness or on Perceived Ease of Use. Trust had no effect on Perceived Usefulness.
7.	Mahande, Jasruddin, & Nasir, 2019	To analyse the effect of the IS success model variables on Edmodo's e-learning User Satisfaction through the TAM variables	Electronic Learning System	Survey and Observation from 161 respondents	Indonesia	DeLone & McLean IS success model; TAM	Descriptive Statistics and Path Analysis	The results showed that System Quality, Information Quality, ands Service Quality had significant effects on Perceived Usefulness, and Perceived Ease of Use. Perceived Usefulness, and Perceived Ease of Use both affected User Satisfaction.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
8.	Maulani & Hamdani, 2019	To examine the relationship between information technology use and organisational competitiveness in higher education in Indonesia	University Management System	Survey of 29 private universities	Indonesia	DeLone & McLean IS success model	Partial Least Squares–Structural Equation	The results revealed that Information Quality, System Quality and Service Quality had significant positive impacts on the Competitiveness of universities in Indonesia.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
9.	Salloum, Qasim, Al-Emran, Abdel, & Shaalan, 2019	To analyse the e-learning research studies that employed the technology acceptance model (TAM and determine the most frequent external factors used to extend TAM. To empirically examine the impact of the external factors that achieved significant results in the students' adoption of e-learning	Electronic Learning System	Survey of 435 respondents	United Arab Emirates (UAE)	Extended TAM	PLS-SEM	The results indicated that System Quality, Computer Self-efficacy, and Computer Playfulness had significant impacts on Perceived Ease of Use. Information Quality, Perceived Enjoyment, and Accessibility were found to positively influence both Perceived Ease of Use and Perceived Usefulness.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
10.	Sharma & Sharma, 2019	To propose a new research model by extending the DeLone & McLean IS success model to understand users' actual usage of m-banking	Mobile Banking	Survey of 227 Omani residents.	India	DeLone & McLean IS success model	Structural Equation Modelling and Neural	The study found that User Satisfaction and Intention to Use a system stand as two important precedents of actual usage, and the User Satisfaction also mediates the relationship of Service Quality, Information Quality and Trust to the Intention to Use m-banking and negates that of System Quality.
11.	Vigim, 2019	To determine the success of a remuneration information system	Renumeration Information System	Survey of 51 of 101 work departments	Indonesia	DeLone & McLean IS success model	PLS	The study found that System Quality affected User Satisfaction. Information Quality had a positive effect on User Satisfaction. User Satisfaction had a positive effect on personal impact.
12.	Wang et al., 2019	To examine a paid m-learning app's success from an m-learner perspective	Mobile Learning Apps	Survey of 160 users	Taiwan	Extended the DeLone & McLean IS success model	SEM	The study found that User Satisfaction and Intention to Reuse were determined by System Quality and Information Quality.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
13.	Yassierli et al., 2019	To evaluate the importance of Usability in mobile commerce applications for Users' Satisfaction and Continuance Intention	Mobile Commerce Applications	Survey of 230 respondents	Indonesia	DeLone & McLean IS success model	SEM	The study found that there were positive and significant relationships among Service Quality, Information Quality, Usability, User Satisfaction and Continuance Intention.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
14.	Alshibly, 2020	To develop and empirically validate a comprehensive model of business intelligence system effectiveness	Business Intelligence System (BIS)	Survey of 138 respondents	Jordan	DeLone & McLean IS success model; TAM	PLS-SEM	The study results suggest that the degree to which using the BIS would enhance end-user performance is an important factor affecting Decision Support Satisfaction. An increase in the Information Quality and System Quality of the BIS leads to an increase in Decision Quality. Any net positive effect from BIS information and system characteristics will result in a positive significant impact on users' Perceived Usefulness. An increase in Decision Support Satisfaction leads to an increase in the perceived benefits that an organisation and users get from using the BIS.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
15.	Al-Fraihat, Joy, Masa'deh & Sinclair, 2020	To evaluate e-learning system success	Electronic Learning System	Survey of 563 students	United Kingdom	DeLone & McLean IS success model, user satisfaction models, e-learning quality models, TAM, unified theory of acceptance and use of technology (UTAUT)	PLS-SEM	The study found that the determinants of Perceived Satisfaction were Technical System Quality, Information Quality, Service Quality, Support System Quality, Learner Quality, Instructor Quality and Perceived Usefulness. Drivers of Perceived Usefulness were Technical System Quality, Information Quality, Support System Quality, Learner Quality, and Instructor Quality. Determinants of System Use were Educational System Quality, Support System Quality, Learner Quality and Perceived Usefulness. Net Benefit was explained by Perceived Usefulness, Perceived Satisfaction and Use.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
16.	Al-Okaily, Al-Okaily, Shiyyab, & Masadah, 2020	To explore the influence of accounting information system success or effectiveness factors on the organisational benefits of listed firms	Accounting Information System	Survey of 117 Chief Finance Officers	Jordan	DeLone & McLean IS success model	PLS-SEM	The results showed that Information Quality, Service Quality and Training Quality made positive and significant contributions to the organisational benefits. However, System Quality did not have any significant impact on the organisational benefits.
17.	Al-Naimat et al., 2020	To establish and empirically analyse a research model of mobile commerce usage in the hospitality industry, and to explore driving factors for the use of mobile commerce	Mobile Commerce	Survey of 168 hospitality SMEs	Jordan	DeLone & McLean IS success model; TAM	SEM	The study found that the quality of the system and the quality of service were among the most important factors for adopting mobile commerce. It also found that the mobile commerce adoption had a positive impact on mobile commerce usage.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
18.	Amalina & Suryani, 2020	To identify the indicators that affect the success of E-Invoice implementation	Electronic Invoice System	Survey of 34 users	Indonesia	DeLone & McLean IS success model	PLS	The study found that Information Quality, Service Quality and System Quality had no significant impact on the Intention to Use the system. Information Quality, System Quality and Service Quality had no significant impact on User Satisfaction. User Satisfaction had no impact on Intention to Use or on Net Benefits. Intention to use had no significant impact on Net Benefits.

| 19. | Dari & Prahartiwi, 2020 | To analyse the following hypotheses:

H1: System Quality has a positive effect on Use

H2: Use has a positive effect on Net Benefits

H3: System Quality has a positive effect on User Satisfaction

H4: User Satisfaction has a positive effect on Use

H5: Information Quality has a positive effect on Use

H6: Information Quality has a positive effect on User Satisfaction

H7: User Satisfaction has a positive effect on Net Benefits

H8: System Quality has a positive effect on Information Quality

H9: Information Quality has a positive | Mobile Application | Survey of 267 respondents | Indonesia | DeLone & McLean IS success model | SEM | System Quality has a positive effect on User Satisfaction.

User Satisfaction has a positive effect on Net Benefits and on Use. |

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
		effect on System Quality						
20.	Itthiphone, Jo & Kwon, 2020	To identify factors that affect the Intention of Continued Use of mobile payment services of users in Korea and Laos	Mobile Payment	Survey of 200 respondents in Korea, and 189 respondents in Laos.	Korea and Loas	DeLone & McLean IS success model	Correlation	The study found that System Quality had a positive effect on User Satisfaction. Service Quality had no significant effect on User Satisfaction. Information Quality had a significant effect on User Satisfaction.
21.	Lee & Jeon, 2020	To investigate the features affecting User Satisfaction and Net Benefits of a mobile learning management system for cyber university students working in the hospitality industry	Mobile Learning Management System	Survey of 328 students in cyber universities	Korea	DeLone & McLean IS success model	SEM	The results showed that Information Quality, System Quality and Service Quality had positive effects on User Satisfaction, and User Satisfaction had a positive effect on Net Benefits.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
22.	Martono, Nurkhin, Mukhibad, Anisykurlillah, & Wolor, 2020	To understand the determinants of an employee's intention to use the information system To examine the influence of DeLone & McLean IS success model dimensions on its Perceived Usefulness and Perceived Ease of Use	Financial Information System	Survey of 248 respondents	Indonesia	DeLone & McLean IS success model; TAM	SEM	The study results showed that Perceived Ease of Use and Perceived Usefulness had a positive and significant influence on Intention to Use. System Quality and Information Quality had a significant influence on Intention to Use. Service Quality had no significant influence on Intention to Use. Intention to Use was a determinant of Actual Usage. Perceived Ease of Use was significantly determined by System Quality, Information Quality and Service Quality. Perceived Usefulness was significantly determined by System Quality and Information Quality.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
23.	Mkinga & Mandari, 2020	To determine the effectiveness of a student information system	Student Information System	Survey of 391 respondents	Tanzania	DeLone & McLean IS success model	Regression Analysis	The findings showed that System Quality had a positive and significant effect on System Use. System Use had a positive effect on System Effectiveness. Service Quality influenced both System Use and User Satisfaction. Information Quality had positive effects on User Satisfaction.
24.	Sorongan & Hidayati, 2020	To analyse and test variables that influence the implementation of e-government	Electronic Government System	Survey of 100 respondents	Indonesia	DeLone & McLean IS success model	SEM	The study found that Information Quality affected System Use and User Satisfaction. System Quality did not affect User Satisfaction. System Use did not affect Net Benefits. User Satisfaction affected Net Benefits but did not affect System Use.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
25.	Yoo, 2020	To examine the effect of quality perception on loyalty through consumers' perceived diagnosticity and satisfaction	Mobile Commerce	Survey of 283 mobile shoppers	Korea	DeLone & McLean IS success model	SEM	The study found that Information Quality positively influenced User Satisfaction. System Quality did not influence User Satisfaction.
26.	Alkhawaja, Halim, Abumandil, & Al-Adwan, 2021	To explore how System Quality influences e-learning System Acceptance. To examine how Perceived Usefulness and Intention to Use mediate the impact of System Quality on Actual Use	Electronic Learning System	Survey of 336 respondents	Jordan	DeLone & McLean IS success model; TAM	SEM	The study findings revealed that System Quality significantly affected Perceived Usefulness. Intention to Use and Perceived Usefulness significantly affected System Use. System Quality did not affect System Use.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
27.	Al-Adwan, Albelbisi, Hujran, Al-Rahmi, & Alkhalifah, 2021	To assess effective use and successful implementation of e-learning systems To illustrate key factors that influence the success of e-learning systems	Electronic Learning System	Survey of 537 respondents	Jordan	DeLone & McLean IS success model; TAM	SEM	The findings demonstrated that System Quality, Information Quality, Service Quality, Instructor Quality, Technical System Quality, Support Service Quality, Educational Systems Quality and Course Content Quality had a direct positive influence on Satisfaction, Perceived Usefulness and System Use. Self-regulated Learning negatively affected Satisfaction, Perceived Usefulness and System Use. Satisfaction, Perceived Usefulness and System Use were key predictors of academic performance.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
28.	Anggraeni & Sanjaya, 2021	To determine the success rate of a personnel management information system	Personnel Management Information System	Survey of 118 respondents	Indonesia	DeLone & McLean IS success model	Regression Analysis	The results of the study showed that the personnel management information system was successfully implemented. The Quality of Information had a positive and significant impact on User Satisfaction.
29.	Isnaeningsih et al., 2021	To analyse the effect of Information Quality, System Quality and Service Quality on User Satisfaction so that it has an impact on User Performance	Mobile Application	Survey of 61 responses	Indonesia	DeLone & McLean IS success model	PLS	The study found that Information Quality had no effect on User Satisfaction. Service Quality and System Quality had positive effects on User Satisfaction.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
30.	Lee & Kim, 2021	To examine factors that affect the usefulness of digital health care services perceived by users and their use satisfaction	Digital Health Care Services	Survey of 364 respondents	Korea	DeLone & McLean IS success model; TAM; personal influence factor; social impact factor	SEM	Study results showed that Personal Influence factors and Social Impact factors positively affected Perceived Usefulness. Information Quality factors did not affect Perceived Usefulness. Personal Influence factors and Information Quality factors had positive effects on User Satisfaction. Social Impact factors did not affect User Satisfaction.
31.	Lee, Nagpal, Lim, Dutil, Lee, & Kim, 2021	To identify the critical drivers that impact collaborative commerce platform loyalty	Collaborative Commerce Services	Survey of 295 respondents	United States of America (USA)	DeLone & McLean IS success model	SEM	Results confirmed that Perceived Value and Platform Quality were the best predictors for Platform Loyalty, which in turn, had a positive influence on Future Extended Use Intention.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
32.	Kautish, Paul, & Sharma, 2021	To investigate the relationship between Product Assortment and Order Fulfilment, and their effects on Shopping Assistance, Shopping Efficiency and Purchase Behaviour for online fashion apparels	e-Tail Services	Survey of 442 respondents	India	Service-dominant logic (SD logic)	Covariance-based structural equation modelling (CB-SEM), hierarchical regression analysis	The findings revealed that there are certain e-tail value-disposition-oriented benefits in investing in an Order Fulfilment landscape rather than Product Assortment. The mediating roles of Shopping Assistance and Shopping Efficiency were empirically verified. The moderating influence of Fulfilment Reliability was also confirmed.
33.	Nugraheni & Bayastura, 2021	To analyse factors that affected students' Satisfaction and Usefulness after using an attendance system	Student Attendance System	Survey of 506 respondents	Indonesia	DeLone & McLean IS success model; TAM	SEM	The results found that Service Quality, System Quality, and Information Quality all had effects on both Usefulness and User Satisfaction.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
34.	Paramartha et al., 2021	To examine factors that affect the stickiness of the LINE TODAY app	Mobile Application	Mixed methods: 76 survey respondents and eight interviews	Indonesia	DeLone & McLean IS success model; customer engagement theory	PLS-SEM	The study found that System Quality and Information Quality positively affected User Satisfaction. Service Quality did not affect User Satisfaction.
35.	Prasetyo, Ong, Concepcion, Navata, Robles, Tomagos, Young, Diaz, Nadlifatin, & Redi, 2021	To determine factors for acceptance of an online learning platform among students during the COVID-19 pandemic	Electronic Learning Platforms	Survey of 500 senior high school students	Switzerland	DeLone & McLean IS success model; Extended TAM (eTAM)	SEM	The results indicated that Perceived Ease of Use had the greatest effect on Actual Use, followed by User Interface and System Quality towards Perceived Ease of Use, which subsequently led to Behavioural Intentions and Actual Use. Information Quality was found to have a significant effect on Perceived Usefulness, which led to Behavioural Intentions and Actual Use.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
36.	Pratomo, Agusdin, Tahalea, & Cahyana, 2021	To measure the success of the SRIKANDI system implementation	Research and Community Service Management Information System	Survey of 150 lecturers who had used SRIKANDI	Indonesia	DeLone & McLean IS success model	Regression Analysis	The study found that System Quality, Information Quality and Service Quality had positive influences on User Satisfaction. Users of the system were satisfied and continued to use the system because they benefitted from using the system.
37.	Purwati, Mustafa & Deli, 2021	To evaluate the satisfaction level and benefit of the usage of a mobile banking system	Mobile Banking System	Survey of 200 customers	Indonesia	DeLone & McLean IS success model	SEM	The study found that System Quality had a significant effect on User Satisfaction. Information Quality had a positive effect on User Satisfaction. Service Quality had a positive effect on User Satisfaction. User Satisfaction had a positive effect on Net Benefits.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
38.	Rahman & Ekaputri, 2021	To analyse the implementation of an online accounting system to support financial performance	Web-based Accounting System	Observations, Interviews and Literature Research	Indonesia	DeLone & McLean IS success model	Descriptive Analysis	The study highlights that an accounting web application effectively and efficiently supports to business activities. The system helps users to automatically create complete financial reports. It is also very easy to use this application. The effectiveness of the application is indicated by the fact that it fulfilled the criteria of System Quality, Quality of Information, Quality of Service, Utilisation, User Satisfaction and Organisational Benefits.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
39.	Salim, Alfansi, Anggarawati, Saputra, & Afandy, 2021	To examine the role of Perceived Usefulness in moderating User Satisfaction	Educational Portal	Survey of 200 respondents	Indonesia	DeLone & McLean IS success model; TAM	PLS-SEM	The study found that System Quality had a positive effect on User Satisfaction. Information Quality had a positive impact on User Satisfaction. Service Quality positively affected User Satisfaction.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
40.	Sari, Hidayatullah, Prasetya, & Arman, 2021	To evaluate the success of the implementation of the IBM-IOC system	IBM-IOC (International Business Machines– Corporation- Intelligent Operations Center)	Survey of 80 respondents	Indonesia	DeLone & McLean IS success model	SEM	The study found that Information Quality had positive significance for System Use and User Satisfaction. System Quality had positive significance for System Use, but no significance for User Satisfaction. Service Quality had positive significance for System Use, but no significance for User Satisfaction. System Use and User Satisfaction had positive significance for Net Benefits.
41.	Almaiah, Al-Otaibi, Lutfi, Almomani, Awajan, Alsaaidah, Alrawad, & Awad, 2022	To explore the role of quality measurements in promoting the usability of m-learning systems during COVID-19	Mobile Learning Application	Survey of 450 respondents	Saudi Arabia	DeLone & McLean IS success model; TAM	PLS-SEM	The results revealed that System Quality, Information Quality and Service Quality were the most important factors affecting mobile learning usability among learners during COVID-19.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
42.	Febrian & Kurniawan, 2022	To study the effect of Web Design Quality, Sales Promotion, and Order Fulfillment on Repurchase Intention, with Customer Satisfaction as a mediating variable	Electronic Commerce System	Survey of 287 respondents	Indonesia	N/A	PLS-SEM	The study found positive and significant impacts on all of the variables studied.
43.	Gurendrawati, Sasmi, Ulupui, Murdayanti, Anwar, & Wahyuningsih, 2022	To see the perception of the use of an educational service system	Academic Service Systems	Survey of final year and graduate students	Indonesia	DeLone & McLean IS success model	Framework for the Application of System	There were significant positive effects of System Quality and Service Quality on User Satisfaction.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
44.	Kurniasari, Gunawan, & Utomo, 2022	To analyse the benefits of adopting e-fulfilment services by considering the variable of TAM that was related to Trust	e-Fulfilment Services Platform	Survey of 90 respondents	Indonesia	TAM; trust	SEM	The study found that Trust played a significant role in influencing customer adoption of the e-fulfilment platform. Perceived Ease of Use was the main factor in creating customer Trust.
45.	Kurt et al., 2022	To investigate the factors affecting users' satisfaction with online shopping and their intention to continue using it	Online Shopping	Survey of 313 online shopping users	Turkey	DeLone & McLean IS success model; information system continuance model; TAM	PLS-SEM	The study found that Information Quality had a significant positive effect on User Satisfaction. System Quality had no significant impact on User Satisfaction.
46.	Malada, 2022	To determine the factors that influenced continuing interest in using the BPJSTKU mobile application, amongst the workforce at PT Mitsubishi Motors	Mobile Application	Survey of 210 respondents	Indonesia	DeLone & McLean IS success model; TAM; UTAUT	SEM	The results showed that System Quality had a positive effect on User Satisfaction and Perceived Usefulness. Information Quality had a positive and significant effect on User Satisfaction.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
47.	Mawart & Seprina, 2022	To analyse the success of an academic information system	Academic Information System	Survey of 100 respondents.	Indonesia	DeLone & McLean IS success model	Validity test, reliability test, normality test, multicollinearity test,	The study findings indicated that users of the system derived benefits from using the system.
48.	Mekonnen, Lessa, & Negash, 2022	To propose a theoretical model for measuring Enterprise Resource Planning (ERP) post-implementation success	ERP	Survey of 233 respondents	Ethiopia	DeLone & McLean IS success model	PLS-SEM	The study findings indicated that ERP Service Quality had the highest significance in affecting ERP post-implementation. ERP System Quality also had a significant effect on ERP post-implementation benefits. ERP Information Quality was the least impactful.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
49.	Nani & Lina, 2022	To examine the effect of System Quality, Information Quality and Reliability on User Satisfaction with mobile commerce, the effect of User Satisfaction on the Intention to Use mobile commerce continually, and the role of User Experience in strengthening the relationship between User Satisfaction and Intention to Use mobile commerce continually	Mobile Commerce	Survey of 196 mobile commerce consumers	Indonesia	DeLone & McLean IS success model	PLS-SEM	The study findings indicated that System Quality had a positive effect on User Satisfaction. Information Quality had no effect on User Satisfaction.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
50.	Shabila & Djamaludin, 2022	To analyse the level of student satisfaction with the use of the IPB University mobile application for students	Mobile Application	Survey of 306 respondents	Indonesia	DeLone & McLean IS success model	SEM	The results showed that the Perception of Quality variable had a positive and significant effect on User Satisfaction. The results also indicated that Consumer Satisfaction had a positive and significant effect on Net Benefits.
51.	Shaw, Eschenbrenner, & Baier, 2022	To understand the factors that explain the potential of online shopping continuance	Online Shopping	Survey of approximately 500 respondents from each country	Canada, Germany, the USA	ES-QUAL, hedonic motivation, social shopping, health susceptibility	PLS-SEM	The study found that Convenience, Efficiency, Fulfillment, and Security are important factors for some females for online shopping's Perceived Usefulness and Intention to Continue shopping online. Enjoyable Online Shopping Experience adds to the continuance intention.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
52.	Susanti & Mauritsius, 2022	To describe factors affecting User Satisfaction in using beauty and skincare mobile commerce applications	Mobile Application	Survey of 185 respondents	Indonesia	DeLone & McLean IS success model; TAM; trust	PLS-SEM	The study showed that System Quality had a significant influence on User Satisfaction. Information Quality did not have a significant influence on User Satisfaction. Service Quality did not have a significant influence on User Satisfaction.
53.	Usadi, JS, & Permadi, 2022	To explain the effect of the Information Quality, System Quality, and Service Quality on Use Satisfaction, and Switching Intention	Mobile Application	Survey of 100 respondents	Indonesia	DeLone & McLean IS success model	PLS	The study found that Information Quality had a significant positive effect on User Satisfaction. System Quality had a significant positive effect on User Satisfaction. User Satisfaction had a significant negative effect on Intention to Switch.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
54.	Alyoussef, 2023	To evaluate the usefulness of Task–Technology Fit with the DeLone & McLean IS success model in perceiving students' adoption of e-learning	Electronic Learning System	Survey of 260 respondents	Saudi Arabia	DeLone & McLean IS success model; task–technology fit	PLS-SEM	The study found that the Perceived Ease of Use, Perceived Usefulness, System Use and Task–Technology Fit of e-learning were positively and significantly influenced by System Quality, Information Quality, Perceived Enjoyment, Technology Characteristics and Task Characteristics. System Use showed a positive effect on e-learning Benefits. All students were satisfied with the use of the e-learning system.

No	Author	Study Aim	Type of Information System	Research Approach	Study Location	Theoretical Framework	Data Analysis	Study Findings
55.	Zebua & Widuri, 2023	To analyse the factors of cloud accounting	Cloud Accounting Information System	Survey of 175 respondents	Indonesia	DeLone & McLean IS success model; TAM; technology, organisation, environment (TOE)	PLS-SEM	The results indicated that Top Management Support, Organisational Competency, Service Quality, and System Quality positively affected Perceived Usefulness and Ease of Use. Perceived Usefulness positively affected the Intention to Use. Perceived Ease of Use positively impacted Perceived Usefulness and Intention to Use. Intention to Use had a positive effect on Adoption .

2.4 Literature Analysis Findings

The following subsections discuss the literature analysis findings from the type of information systems, research approaches, study locations, theoretical frameworks, data analyses, and concepts used of the studies presented in Table 2.1.

2.4.1 Type of Information System

Of the 55 studies presented in Table 2.1, 31% (17) were on different types of mobile applications such as mobile commerce applications, mobile learning applications, mobile banking applications, and mobile payment applications; and 38% (21) of the studies were on an e-commerce system, e-invoice system, e-government system, collaborative commerce system, web-based accounting system, cloud-based accounting system, educational portal, online shopping system, e-tailing system, e-fulfilment system, and digital health system. The rest of the studies were on traditional information systems, such as health information, academic, university management, remuneration information, financial information, and business intelligence systems.

2.4.2 Research approach

Most of the studies 96% (53) collected data by means of surveys, whilst the remaining 4% (2) used a combination of surveys, interviews, observations and the existing literature.

2.4.3 Study location

55% (30) of the studies were conducted in Indonesia, whilst the rest of the studies were from Canada, Ethiopia, Germany, India, Iran, Jordan, Korea, Loas, Saudi Arabia, Switzerland, Taiwan, Tanzania, Turkey, the United Arab Emirates, the United Kingdom, the USA, and Yemen.

2.4.4 Theoretical framework

49% (27) of the studies used the DeLone and McLean IS success model as the theoretical framework, 18% (10) combined the DeLone and McLean IS success model with TAM; 16% (9) of the studies combined the DeLone and McLean IS success model with other theories, including TAM, UTAUT, and Task–Technology Fit, with individual variables from other theories; and another 16% (9) of the studies used other theories as their main theoretical framework, with some variables from the DeLone and McLean IS success model.

2.4.5 Data analysis

To analyse data and test for the hypothesised relationships, 40% (22) of the studies used structural equation modelling, 27% (15) used partial least squares structural equation modelling, 7.3% (4) used partial least squares, 7.3% (4) used regression analysis, and 4% (2) used correlation. The rest of the studies used other data analysis techniques, such as the framework for the application of system thinking (FAST), and a validity test, reliability test, normality test, multicollinearity test, F test, and T test.

2.4.6 Concepts used

Concepts used by the studies in Table 2.1 are in the concept matrix spread across Table 2.2 and Table 2.3. The main concepts used were System Quality (83%), Information Quality (82%), User Satisfaction (69%), Service Quality (64%), System Use/Intention to Use (44%), Perceived Usefulness (42%), Net Benefits (33%), Perceived Ease of Use (33%), and Continuance Intention (12%). The rest of the concepts were used by less than 10% of the studies.

TABLE 2.2: LITERATURE REVIEW RESULTS – CONCEPT MATRIX

Author	System Quality	Technical System Quality	Educational System Quality	Perceived Ease of Use	Usability	Information Quality	Content Quality	Visual Quality	Service Quality	Support System Quality	Learner Quality	Instructor Quality	Decision Quality	System Use/Intension to	Accessibility	Computer Self-efficacy	Computer Playfulness	Continuance Intention	Computer Experience	Intention to Adopt	Behavioural Intentions	Attitude Towards Using	User Satisfaction	Decision Support	Individual Impact	Net Benefits	Organisational Benefits	Perceived Benefits	Perceived Usefulness	Perceived Diagnosticity	Perceived Enjoyment	Perceived Fee	Learning Effectiveness	Trust	Loyalty	Subjective Norm	Top Management Support	User Training	Competitiveness
Al-Fraihat et al., 2020	x	x	x			x			x	x	x	x		x									x		x				x										
Al-Mamary et al., 2019	x					x			x							x			x				x	x					x								x	x	
Al-Naimat et al., 2020				x					x					x						x									x										
Al-Okaily et al., 2020	x					x			x																		x												
Alshibly, 2020	x					x							x											x	x				x										
Amalina & Suryani, 2020	x					x			x					x									x						x										
Angelina et al., 2019	x					x			x					x									x						x										

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Author	System Quality	Technical System Quality	Educational System Quality	Perceived Ease of Use	Usability	Information Quality	Content Quality	Visual Quality	Service Quality	Support System Quality	Learner Quality	Instructor Quality	Decision Quality	System Use/Intension to	Accessibility	Computer Self-efficacy	Computer Playfulness	Continuance Intention	Computer Experience	Intention to Adopt	Behavioural Intentions	Attitude Towards Using	User Satisfaction	Decision Support	Individual Impact	Net Benefits	Organisational Benefits	Perceived Benefits	Perceived Usefulness	Perceived Diagnosticity	Perceived Enjoyment	Perceived Fee	Learning Effectiveness	Trust	Loyalty	Subjective Norm	Top Management Support	User Training	Competitiveness
Dari & Prahartiwi, 2020	x					x								x									x			x													
Ebnehoseini et al., 2019	x					x			x					x									x			x				x	x	x							x
Elsdaig & Nassar, 2019	x					x			x					x									x			x													
Fitriani et al., 2019	x			x		x			x									x		x	x								x					x		x			
Itthiphone et al., 2020	x					x			x									x					x													x			
Jusuf et al., 2019	x			x		x			x					x								x	x			x			x							x			
Lee & Jeon, 2020	x					x			x														x			x													
Mahande et al., 2019	x			x		x			x														x						x										
Martono et al., 2020	x			x		x			x					x															x										

Author	System Quality	Technical System Quality	Educational System Quality	Perceived Ease of Use	Usability	Information Quality	Content Quality	Visual Quality	Service Quality	Support System Quality	Learner Quality	Instructor Quality	Decision Quality	System Use/Intension to	Accessibility	Computer Self-efficacy	Computer Playfulness	Continuance Intention	Computer Experience	Intention to Adopt	Behavioural Intentions	Attitude Towards Using	User Satisfaction	Decision Support	Individual Impact	Net Benefits	Organisational Benefits	Perceived Benefits	Perceived Usefulness	Perceived Diagnosticity	Perceived Enjoyment	Perceived Fee	Learning Effectiveness	Trust	Loyalty	Subjective Norm	Top Management Support	User Training	Competitiveness
Maulani & Hamdani, 2019	x					x			x																														x
Mkinga & Mandari, 2020	x					x			x					x									x					x											
Salloum et al., 2019	x			x		x	x							x	x	x	x			x	x								x		x					x			
Sharma & Sharma, 2019	x					x			x					x									x			x								x					
Sorongan & Hidayati, 2020	x					x								x									x			x													
Vigim, 2019	x					x																	x	x															
Wang et al., 2019	x					x								x									x							x	x	x							
Yassierli et al., 2019				x	x	x			x									x					x																
Yoo, 2020	x					x		x															x						x							x			

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Author	System Quality	Technical System Quality	Educational System Quality	Platform Quality	Perceived Ease of Use	User Interface	Reliability	Information Quality	Content Quality	Service Quality	Support System Quality	Instructor Quality	Relationship Quality	System Use/Intention to	Continuance Intention	Intention to Adopt	Behavioural Intentions	Switching Intention	User Satisfaction	Net Benefits	Organisational	Perceived Usefulness	Perceived Enjoyment	Perceived Value	Profit	Performance	Self-regulated Learning	Trust	Perceived Security	Platform Loyalty	Brand Awareness	Stickiness	Enthusiasm	Experience	Participation	Social Interaction	Social Influence	Personal Influence	Social Impact	Social Norms	Technology Characteristics	Task Characteristics	Task-technology Fit	Fulfilment Reliability	Product Assortment	[Order] Fulfilment	Shopping Assistance	[Shopping] Efficiency	[Re]Purchase Intentions	Web Design Quality	Sales Promotion	Perceived Privacy	Perceived Convenience	Perceived Health	Social Shopping	Hedonic Motivation
Al-Adwan et al., 2021		x	x						x		x	x		x					x			x					x	x																												
Alkhawaja et al., 2021	x																		x			x																																		
Almaiah et al., 2022	x				x				x		x								x			x																																		
Alyoussef, 2023	x				x				x										x	x		x	x																		x	x	x												
Anggraeni & Sanjaya, 2021	x								x	x									x																																				
Febrian & Kurniawan, 2022																			x																										x				x	x	x					
Gurendrawati et al., 2022	x										x								x																																					
Isnaeningsih et al., 2021	x								x		x								x							x																														

Author	Concepts																																																							
	System Quality	Technical System Quality	Educational System Quality	Platform Quality	Perceived Ease of Use	User Interface	Reliability	Information Quality	Content Quality	Service Quality	Support System Quality	Instructor Quality	Relationship Quality	System Use/Intention to	Continuance Intention	Intention to Adopt	Behavioural Intentions	Switching Intention	User Satisfaction	Net Benefits	Organisational	Perceived Usefulness	Perceived Enjoyment	Perceived Value	Profit	Performance	Self-regulated Learning	Trust	Perceived Security	Platform Loyalty	Brand Awareness	Stickiness	Enthusiasm	Experience	Participation	Social Interaction	Social Influence	Personal Influence	Social Impact	Social Norms	Technology Characteristics	Task Characteristics	Task–technology Fit	Fulfilment Reliability	Product Assortment	[Order] Fulfilment	[Shopping] Efficiency	Shopping Assistance	[Re]Purchase Intentions	Web Design Quality	Sales Promotion	Perceived Privacy	Perceived Convenience	Perceived Health	Social Shopping	Hedonic Motivation
Kautish et al., 2021																																												x	x	x	x	x								
Kurniasari et al., 2022				x												x						x						x	x																											
Kurt et al., 2022	x							x								x			x			x															x																			
Lee & Kim, 2021								x											x			x															x	x																		
Lee et al., 2021			x											x	x				x					x												x																				
Malada, 2022	x							x								x			x			x																					x													
Mawart & Seprina, 2022	x							x		x						x			x	x																																				
Mekonnen et al., 2022	x							x		x														x																																
Nani & Lina, 2022	x						x	x								x						x														x																				

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Author	System Quality	Technical System Quality	Educational System Quality	Platform Quality	Perceived Ease of Use	User Interface	Reliability	Information Quality	Content Quality	Service Quality	Support System Quality	Instructor Quality	Relationship Quality	System Use/Intension to	Continuance Intention	Intention to Adopt	Behavioural Intentions	Switching Intention	User Satisfaction	Net Benefits	Organisational	Perceived Usefulness	Perceived Enjoyment	Perceived Value	Profit	Performance	Self-regulated Learning	Trust	Perceived Security	Platform Loyalty	Brand Awareness	Stickiness	Enthusiasm	Experience	Participation	Social Interaction	Social Influence	Personal Influence	Social Impact	Social Norms	Technology Characteristics	Task Characteristics	Task–techology Fit	Fulfilment Reliability	Product Assortment	[Order] Fulfilment	Shopping Assistance	[Shopping] Efficiency	[Re]Purchase Intentions	Web Design Quality	Sales Promotion	Perceived Privacy	Perceived Convenience	Perceived Health	Social Shopping	Hedonic Motivation
Nugraheni & Bayastura, 2021	x							x		x									x			x																																			
Paramartha et al., 2021	x							x		x									x												x	x	x		x	x																					
Prasetyo et al., 2021	x				x	x		x						x			x					x																																		
Pratomo et al., 2021	x							x		x				x					x	x																																				
Purwati et al., 2021	x							x		x									x	x																																				
Rahman & Ekaputri, 2021	x							x		x				x					x					x																																
Salim et al., 2021	x							x		x									x			x																																		
Sari et al., 2021	x							x		X				x					x	x																																				

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Author	System Quality	Technical System Quality	Educational System Quality	Platform Quality	Perceived Ease of Use	User Interface	Reliability	Information Quality	Content Quality	Service Quality	Support System Quality	Instructor Quality	Relationship Quality	System Use/Intention to	Continuance Intention	Intention to Adopt	Behavioural Intentions	Switching Intention	User Satisfaction	Net Benefits	Organisational	Perceived Usefulness	Perceived Enjoyment	Perceived Value	Profit	Performance	Self-regulated Learning	Trust	Perceived Security	Platform Loyalty	Brand Awareness	Stickiness	Enthusiasm	Experience	Participation	Social Interaction	Social Influence	Personal Influence	Social Impact	Social Norms	Technology Characteristics	Task Characteristics	Task–technology Fit	Fulfilment Reliability	Product Assortment	[Order] Fulfilment	Shopping Assistance	[Shopping] Efficiency	[Re]Purchase Intentions	Web Design Quality	Sales Promotion	Perceived Privacy	Perceived Convenience	Perceived Health	Perceived Shopping	Social Shopping	Hedonic Motivation
Shabila & Djamaludin, 2022	x							x	X										x	x																																					
Shaw et al., 2022a																x						x							x																x		x						x	x	x	x	x
Susanti & Mauritsius, 2022	x				x			x	x													x						x																													
Usadi et al., 2022	x							x	x										x	x																																					
Zebua & Widuri, 2023	x		X						x										x	x																																					

The following sections discuss the literature review for this study.

2.5 Mobile Commerce Applications

The emergence of internet-enabled devices such as smartphones has provided opportunities for e-commerce to take advantage of the gains of mobility, resulting in a new form of e-commerce called mobile commerce, which allows users to access company products and services whilst on the move (Nani & Lina, 2022).

As a result of changing consumer lifestyles and different economical needs in our days, consumers' use of mobile technology has resulted in increased mobile commerce services (Sharma & Sharma, 2019). Following the era of e-commerce, mobile commerce is likely to be the next generation of business activities, particularly in developing countries (Al-Adwan et al., 2019). Mobile commerce refers to a form of commerce that relates to any business transaction performed using a mobile device through mobile applications (Yassierli et al., 2019). These commercial activities can be anything from buying, paying, selling, and tracking of products and services online by business to customers (B2C), business to businesses (B2B), customers to customers (C2C), or government to constituencies (G2C) (Al-Adwan et al., 2019).

Mobile commerce providers need to give customers the ability to search for information, view products or services, place an order, make a payment, and receive post sales product feedback from their mobile commerce customers (Nani & Lina, 2022). Mobile commerce is a subset of e-commerce that provides new opportunities to business through customers' using mobile devices whilst in motion. The new business opportunities bring new customer groups from different channels, such as mobile networks and devices, with differentiated services and products (Bhullar & Gill, 2019). Although e-commerce resulted in companies providing their products and services differently over the years, mobile commerce has introduced a new phenomenon in the evolution of online commerce activities (Al-Adwan et al., 2019). This is because "mobile commerce offers multiple advantages like ubiquity, personalisation, flexibility, and distribution, instant connectivity, immediacy" (Bhullar & Gill, 2019, p. 246).

Although some researchers consider mobile commerce as an extension of e-commerce (Bhullar & Gill, 2019), e-commerce transactions are typically performed on stationery personal computers that are physically connected to the wired network, whilst mobile commerce transactions are performed on mobile devices that are connected to wireless networks (Al-Adwan et al., 2019; Bhullar & Gill, 2019).

Mobile commerce provides better personalisation and ubiquity features than e-commerce (Yassierli et al., 2019). In mobile commerce, customers can save time, effort, and costs when buying products and services because they can do so remotely, in the comfort of their homes and offices, or whilst on the move (Al-Adwan et al., 2019).

Distinct characteristics of mobile commerce, such as localisation, personalisation, ubiquity, flexibility, and convenience, differentiate mobile commerce from e-commerce (Bhullar & Gill, 2019). According to Bhullar and Gill (2019), mobile services are mainly driven by location, personalisation, reachability, and mobility:

Location – Location-based services can determine the user's exact location, which enables the providers to push relevant information to the user's device.
Personalisation – This allows for information to be filtered according to the needs of the users at a specific point in time so as to not overwhelm users with information that is unnecessary and unwanted at that time.
Reachability – Using mobile services enables users to be reached from wherever they are, at any time. Users can also switch off their reachability to all except their preferred list of people.
Mobility – This is the key feature of mobile services. Internet-enabled devices enable users to access information anywhere, any time. Whilst travelling, they can chat to family and friends via social media, make banking transactions, and watch videos on platforms such as YouTube.

Additional mobile commerce drivers include technical improvements in mobile networks, such as higher data transmission speeds, and improved user interfaces and storage in today's mobile devices, while better mobile devices also have good computing capabilities (Al-Adwan et al., 2019).

Although mobile commerce is sometimes seen as part of e-commerce because they have similar factors, the two are not the same; therefore, the factors that drive or limit mobile commerce need to be investigated and analysed differently (Al-Naimat et al., 2020). Issues that affect usability in mobile commerce rather than e-ecommerce result from the low resolution of smartphones, their small screen sizes, and their limited processing capabilities (Yassierli et al., 2019). Critical factors when evaluating mobile commerce applications include content quality, support, system quality, trust, and use (Bhullar & Gill, 2019).

2.6 Information System Evaluation

It is often the case that various stakeholders, including management, practitioners, and researchers, want to understand the success and effectiveness of an information system in order to determine the value provided by the system, as well as to make informed decisions regarding the future of the system (Purwati et al., 2021). Hence, Sari et al (2021) stated that some companies measure the success of their information systems by means of financial measures such as return on investment (ROI). However, not all the benefits and costs of a system can be expressed in monetary terms, so it is not easy to measure success using financial methods alone (Mawart & Seprina, 2022).

Therefore, it becomes necessary to employ other means to quantify the success of an information system. Many other models can be used to measure the success of an information system, such as the technology acceptance model, the diffusion of innovation theory, value-added theories, and the DeLone and McLean IS success model (Elsdaig & Nassar, 2019; Kurt et al., 2022; Nugraheni & Bayastura, 2021; Susanti & Mauritsius, 2022).

2.6.1 The technology acceptance model

The technology acceptance model (TAM) was originally proposed by Fred D. Davis in his 1986 doctoral thesis, and he developed it into a model in 1989 (Elsdaig & Nassar, 2019; Nugraheni & Bayastura, 2021). Its initial purpose was to explain why users accept or reject information technology or an information system in organisations (Kurt et al., 2022; Susanti & Mauritsius, 2022). TAM proposes a behavioural model in which two beliefs, Perceived Ease of Use and Perceived Usefulness, are used to predict users' intention to use a new system (Elsdaig & Nassar, 2019).

Perceived Usefulness comes from "the prospective user's subjective probability that using a specific application system will enhance his or her job or life performance" whilst Perceived Ease of Use is "the degree to which the prospective user expects the target system to be free of effort" (Surendran, 2012, p. 175). One of TAM's assumptions is that Perceived Ease of Use and Perceived Usefulness constructs fully mediate the influence of external variables on the System Use variable (Kurt et al., 2022; Nugraheni & Bayastura, 2021; Susanti & Mauritsius, 2022). However, TAM is criticised for not covering all the important factors of IS evaluation (Musanhi, 2021), hence it was not chosen to underpin this study.

2.6.2 The diffusion of innovation theory

The diffusion of innovation theory (DOI) was developed to study acceptance of technological innovations. According to Shaw, Eschenbrenner, and Brand (2022), the DOI theory has five attributes that determine adoption of an innovation: Compatibility, Complexity, Observability, Relative Advantage, and Trialability. According to the DOI theory, these five characteristics affect the adoption of an innovation as follows (Shaw et al., 2022b):

- **Compatibility** = How the technological innovation is compatible with the prospective users' current values.
- **Complexity** = How difficult or easy is it to use the technological innovation.
- **Observability** = How the results or outcome of using the innovation can be tangibly observed.
- **Relative advantage** = How the new technology is better than its legacy equivalent and provides advantages in assisting its users to accomplish its intended use.
- **Trialability** = How the innovation can be tried out by prospective users to obtain a feel of how it works and what value can be gained from it.

Shaw et al. (2022b) stated that there are strong similarities between the Perceived Usefulness and Ease of Use beliefs in TAM and the Relative Advantage and Complexity characteristics in the DOI theory. In fact, they even went as far as to suggest that the constructs originating from these two theories or models, could be seen as functioning in parallel.

Subsequently, considered together with the Compatibility construct, studies have recognised five characteristics (Compatibility, Complexity, Ease of Use, Perceived Usefulness and Relative Advantage) as the most significant determinants of information system or IT adoption (Shaw et al., 2022b). According to García-Avilés (2020), DOI was criticised for being more agrarian hence not good in assessing technology innovations and in explaining new technology adoptions. DOI was therefore deemed not suitable for this study as the study aimed to evaluate a fairly new technological innovation in the form of mobile commerce applications.

2.6.3 Value-added theories

Value-added theories suggest that software applications that have been developed for business-to-consumer transactions need to create value for both the business and the consumers (Hsia, Wu, & Li, 2008). To satisfy customers' needs, a business-to-customer application needs to be designed and developed, taking into consideration how customers make purchase decisions online, and which activities add value to the customers in this customer decision process (Hsia et al., 2008). According to Eybers (2015), the value added by IT to business has been a longstanding conundrum that researchers have been grappling with. In this regard, there are two major schools of thought. On one hand, some scholars argue that IT does not add value to business because it is just one of several business enablers. On the other hand, some scholars estimate that IT adds significant value to business, even if this value cannot be measured using traditional financial measures such as return on investment (Eybers, 2015). Researchers have used various instruments from other disciplines, such as marketing and business management, to ascertain whether investments in IT systems are yielding the expected results, both for the customers for whom some of the IT system implementations are done, and for the business that invested in the various IT initiatives. In a study that explored the value of business intelligence (BI), Eybers (2015) used the balanced scorecard (BSC) framework to assess the value BI adoption adds to business. The balanced scorecard does this by looking at customer, financial, and internal processes, as well as the people perspective (learning and growth) to assess the business value added by implementing IT in an organisation.

According to Aryani and Setiawan (2020), BSC has failed to keep up with new technological developments and recent business models which include conducting business via internet-based channels such as mobile applications. For this reason, BSC was not considered suitable for this study.

2.6.4 DeLone and McLean information system success model

One of the ways to measure the success of an IS is the DeLone and McLean IS success model (Salim et al., 2021). This model is concerned with measuring the effectiveness and success of the information system manager's actions and investment in information systems, in order to understand the information system's efficacy and value (DeLone & McLean, 1992; DeLone & McLean, 2003). The model was originally developed in 1992 using empirical research on information systems in the 1970s and 1980s that was based on the communication theory (DeLone & McLean, 1992). It is described as a framework for measuring IS success and effectiveness (DeLone & McLean, 2003). Initially, the model consisted of two quality dimensions, System Quality, and Information Quality, as the two main categories to measure how an IS implementation leads to System Use and User Satisfaction, which then result in Individual Impact and Organisational Impact (DeLone & McLean, 1992).

Eleven years after developing the 1992 model, DeLone and McLean presented their updated IS success model (DeLone & McLean, 2003). This was after over 300 studies had adapted, validated, critiqued, and challenged the original model. DeLone and McLean agreed with Pitt, Watson, and Kavan (1995), who slightly modified the original model, that Service Quality was a critical dimension to be added. They disagreed with Seddon (1997) regarding the replacement of the Use dimension and retained this dimension in their updated model. They only agreed with Seddon (1997) on the Net Benefits dimension, which they adopted into their updated model by combining their original Individual Impact and Organisational Impact dimensions. Therefore, the updated model added Service Quality and collapsed Individual Impact and Organisational Impact into Net Benefits (DeLone & McLean, 2003).

Many studies have proven that the DeLone and McLean IS success model is appropriate to measure the different contexts of an information system's success (Anggraeni & Sanjaya, 2021).

This is because the DeLone and McLean model measures both system and information elements, unlike other information system acceptance theories, which tend to evaluate only certain aspects of an information system (Pratomo et al., 2021). This makes the updated DeLone and McLean IS success model (DeLone & McLean, 2003), the most suitable model for this study to adopt. It is, after all, one of the most cited, prominent, validated, and widely used models for evaluating information system success (Elsdaig & Nassar, 2019; Nugraheni & Bayastura, 2021; Wang et al., 2019). However, the model has not been used a lot in studies that were done in African countries (Mkinga & Mandari, 2020), hence this study adopted it to evaluate the success of the mobile application of a telecommunications company in South Africa. The study followed DeLone and McLean's recommendation that researchers should try to apply the model in the context of their studies as-is, instead of coming up with their own dimensions and unnecessary modifications of the model (DeLone & McLean, 2003).

The following subsections discuss the DeLone and McLean IS success model, including its previous application, validation, modification, and extension in other related studies.

2.7 Information Systems evaluation based on the DeLone and McLean Model

The original DeLone and McLean IS success model (DeLone & McLean, 1992) is depicted in Figure 2.2 with the six dimensions: System Quality, Information Quality, Use, User Satisfaction, Individual Impact, and Organisational Impact.
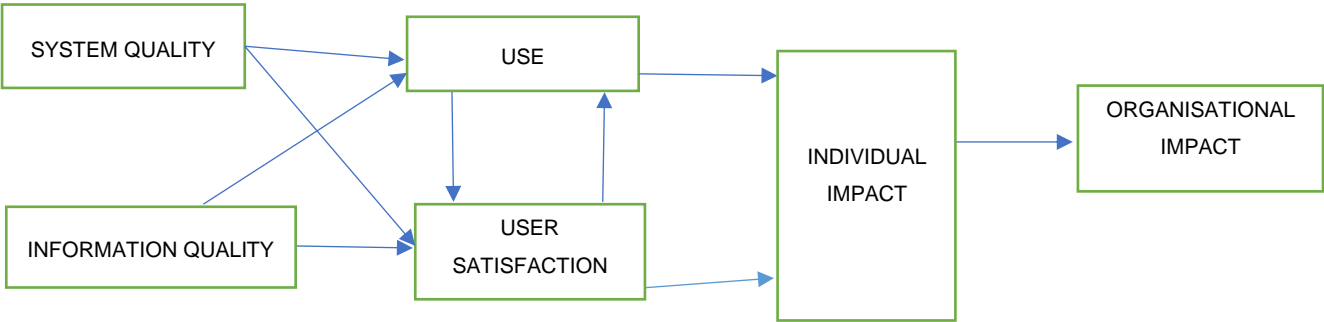
FIGURE 2.2: ORIGINAL DELONE AND MCLEAN IS SUCCESS MODEL

Source: DeLone & McLean, 1992, p. 87

The updated DeLone and McLean IS success model (DeLone & McLean, 2003) is depicted in Figure 2.3 with the six dimensions: System Quality, Information Quality, Service Quality, Intention to Use/Use, User Satisfaction, and Net Benefits.
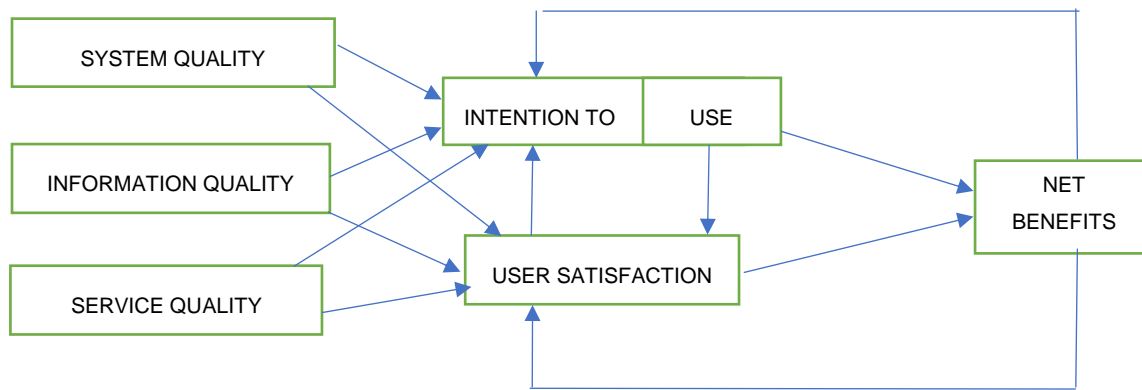
FIGURE 2.3: UPDATED DELONE AND MCLEAN IS SUCCESS MODEL

Source: DeLone & McLean, 2003, p. 24

DeLone and McLean encouraged further validation and development of their models by other researchers, in the context and level of analysis they deemed relevant for their own studies (Rahman & Ekaputri, 2021). Many researchers have, therefore, adapted, critiqued, extended, modified, and validated both models.

2.7.1 System Quality

The expected characteristics of a system are measured under the System Quality dimension (Nani & Lina, 2022). This is done by assessing the software quality aspects of an information system's attributes, such as ease of learning, ease of use, flexibility, and response time (Rahman & Ekaputri, 2021). Early information system researchers investigated online response and reliability under System Quality. In the mid-2000s researchers included attributes such as 24-hour availability, page loading speed, visual appearance, and online response time (Yoo, 2020). "Good visual presentation and interface design will attract consumers to make online purchases" (Yassierli et al., 2019: 152).

The response time of the system is concerned with how long the system takes to respond to user requests such as searching for a product or loading a page. Critical response times are 0.1 seconds – which users consider to be an instantaneous response; 1 second – which still captures the user's thought process; and 10 seconds – at which point the user's attention and patience is at its limit, and many users leave a site that takes longer than 10 seconds to respond or load (Yoo, 2020).

System adaptability refers to how flexible the system is and whether it can adapt to its users' needs, such as providing the information relevant to where or what they are looking for at that specific moment (Yoo, 2020).

In mobile commerce, System Quality is the main attribute used to evaluate whether a mobile application is seamless and works smoothly (Nani & Lina, 2022).

System availability is concerned with whether the system is available whenever its intended users wish to use it (DeLone & McLean, 2003). In mobile commerce, where users may wish to use the system any time, anywhere to perform their intended transactions, the system needs to be available 24 hours a day and seven days a week (Yoo, 2020).

System reliability addresses whether users find the system reliable by ensuring that the system is error and bug free and does not crash in the middle of transactions (DeLone & McLean, 2003).

System usability refers to the ability of the system to carry out the functional activities it was designed, developed, and deployed to fulfil (DeLone & McLean, 2003). It is the degree to which a system can be used effectively and efficiently by its target users for its proclaimed purpose. System usability characteristics include basic functions, ease of learning, ease of use, efficiency of look and design, and error prevention. Online users are affected negatively by poor usability (Yassierli et al., 2019). All categories of software have at least three usability aspects they need to satisfy: (i) users' satisfaction according to their expectations; (ii) efficiency of use, i.e., taking little time to perform a specific task; and (iii) ease of learning the system (Susanti & Mauritsius, 2022).

Table 2.4 below provides a summary of the System Quality attributes discussed above:

TABLE 2.4: SYSTEM QUALITY ATTRIBUTES

Dimension	Attributes	Sources
System Quality	Adaptability	DeLone & McLean, 2003
	Availability	Yoo, 2020
	Ease of learning	Rahman & Ekaputri, 2021
	Ease of use	Kurt et al., 2022
	Flexibility	Nani & Lina, 2022
	Interface design	Susanti & Mauritsius, 2022
	Reliability	
	Response time	
	Usability	
	Visual appearance/Visual presentation	

Previous studies used the DeLone and McLean IS success model to assess and evaluate the success of mobile applications. There were varying results concerning the relationships between System Quality and System Use, and between System Quality and User Satisfaction.

For instance, Elsdaig and Nassar (2019) adopted the updated DeLone and McLean IS success model to evaluate a mobile health application in Saudi Arabia. Their study used a survey questionnaire to collect data from health stakeholders in four hospitals and found that System Quality had a positive effect on System Use.

Wang et al. (2019) extended the DeLone and McLean IS success model to develop and validate a model to assess the success of paid mobile learning applications in Taiwan. After collecting data from 160 users of paid mobile learning applications and using structural equation modeling to test them against their research model, they found that System Use was determined by System Quality, which agrees with Elsdaig and Nassar (2019).

Angelina et al. (2019) adopted the model to analyse the success of mobile commerce in Indonesia. After analysing 110 users of three of the top five mobile commerce applications, they found no significant effect of System Quality on System Use, across all three applications. They attributed this to possible lack of trust of the applications by users, novelty of the applications, as well as development teams not incorporating features that could increase the use levels of the mobile applications.

Nani and Lina (2022) applied the DeLone and McLean IS success model to determine Intention to Use mobile commerce during Covid-19 in Indonesia. Their findings indicated that System Quality had a positive effect on User Satisfaction.

This was in line with Susanti and Mauritsius (2022), who adopted variables from the DeLone and McLean model as well as TAM, and added the Trust variable to understand User Satisfaction in using a mobile beauty and skincare application in Indonesia. Their study showed that System Quality had significant influence on User Satisfaction.

Yassierli et al. (2019) applied the DeLone and McLean IS success model to measure the importance of usability in a mobile commerce application for satisfaction and continuance intention. Their study also found a positive and significant relationships between System Quality and User Satisfaction.

Angelina et al. (2019) equally found that System Quality had a significant effect on User Satisfaction, across all the three applications they investigated. These findings contradicted those of Yoo (2020), who had applied the model to assess the effects of the perceived quality of augmented reality (AR) in mobile commerce and found that System Quality did not influence User Satisfaction. The study suggested that this could be based on AR users attributing system quality issues such as ease of use, reliability, and speed to network connection related factors rather than the mobile application itself.

Kurt et al. (2022) who combined the DeLone and McLean IS success model with TAM to understand the intention of Turkish users to continue using online shopping, also found that System Quality had no significant impact on User Satisfaction. They reckoned that this could be as a result of online shoppers already expecting good system quality from the online shopping websites, hence good system quality observed did not make users more satisfied.

2.7.1.1 Hypotheses 1 and 2
The findings from previous studies led to the following hypotheses by this study in the context of the mobile commerce application under investigation:

H1: System Quality (SQ) has a positive relationship with System Use (SU)
(SQ → SU)

H2: System Quality (SQ) has a positive relationship with User Satisfaction (US)
(SQ → US)

2.7.2 Information Quality

Information Quality is concerned with the standard of information provided by the system. The quality of this information is important because users of the system rely on it to make decisions such as about purchasing services offered (Malada, 2022). Information accuracy, completeness, conciseness, currency, format, personalisation, relevance, secureness, timeliness, understandability, and usability are characteristics that are

typically measured under the Information Quality dimension (Anggraeni & Sanjaya, 2021; Mkinga & Mandari, 2020; Shabila & Djamaludin, 2022). The content and outputs of an information system are also measured under the Information Quality dimension (Isnaeningsih et al., 2021).

Content Quality is the main attraction to customers in mobile commerce applications. The content is directly displayed on the mobile device, and needs to be precise, understandable, up to date, and timeless (Isnaeningsih et al., 2021).

Information Completeness is concerned with ensuring that the information provided to the users is as detailed as possible. In a case of a product, such complete information may include a product name, product description, price, technical details about the product, and contact information for interested customers (Shabila & Djamaludin, 2022).

Information Relevance refers to whether the information on the system is relevant to the product or service that is being sold or advertised (Shabila & Djamaludin, 2022). Additionally, DeLone & McLean (2003) state that the information should also be relevant to the customer's current needs so that it can assist the customer in making the correct decision about the product or service the customers may be interested in buying. Likewise, the information should be packaged and organised in a way that is easy for the people consuming it to understand without getting assistance from someone else (DeLone & McLean, 2003).

Information Security is concerned with whether the system can ensure that intruders such as hackers cannot take control of it and steal the personal information of its users. Security is also concerned with privacy and confidentiality matters, so that private information, such as credit card details that users may need to capture as part of conducting business transactions, is not accessed by third parties not intended to see the information (Shabila & Djamaludin, 2022).

Personalisation is the ability of a system to provide suggested additional information related to the information that the user is currently looking at or browsing. It enables the system to customise the products and services the customer sees based on the context of the specific place and time at which the customer uses the system (Purwati et al., 2021). For example, if the user is looking at an online website that is selling shoes, then the system recommends shoes similar to the shoes that the user is currently viewing. This helps to reduce the number of clicks the customer needs to perform to search for a product or service.

This is necessary in mobile commerce in order to save the already-low battery power of mobile devices, as well as to use the low memory and small screen size of mobile devices optimally (Kurt et al., 2022)

Trust refers to customers' feelings of assurance that the system's information security and privacy controls are strong enough to keep their personal information safe so that it does not end up with unauthorised third parties (Itthiphone et al., 2020; Susanti & Mauritsius, 2022). Online customers do not physically go to business premises and meet the sales personnel in person, therefore their trust in the business' online channels becomes very important. Customers need to trust that their financial information, such as credit card details, will be transmitted and stored safely by the selling businesses. These online users also need to trust that their privacy will be protected and that their online activities will be kept confidential and not shared with third parties (Bhullar & Gill, 2019).

Table 2.5 provides a summary of the Information Quality attributes discussed above.

TABLE 2.5: INFORMATION QUALITY ATTRIBUTES

Dimension	Attributes	Sources
Information Quality	Accuracy	Anggraeni & Sanjaya, 2021
	Completeness	DeLone & McLean, 2003
	Conciseness	Isnaeningsih et al., 2021
	Content	Itthiphone et al., 2020
	Currency	Kurt et al., 2022
	Information format	Malada, 2022
	Personalisation	Mkinga & Mandari, 2020
	Relevance	Purwati et al., 2021
	Secureness	Shabila & Djamaludin, 2022
	Timeliness	Susanti & Mauritsius, 2022
	Understandability	
	Up to datedness	
	Usability	

Previous studies used the DeLone and McLean IS success model to evaluate the success of mobile applications. Varying results concerning the relationships between Information Quality and System Use, and between Information Quality and User Satisfaction were reported.

Elsdaig and Nassar (2019) found that Information Quality had a positive effect on System Use. Yet, Angelina et al. (2019) found that Information Quality had an insignificant effect on Use. They suggested that the insignificant effect of Information Quality on System Use could possibly be due to the mandatory nature of use of the system they were studying.

Malada (2022) combined variables from the DeLone and McLean IS success model, TAM, and UTAUT to determine the factors that influenced users of Mitsubishi Motors' mobile app in Indonesia to continue using the app. Their results showed that Information Quality had a positive and significant effect on User Satisfaction. Wang et al. (2019) agreed with Malada (2022) that User Satisfaction was determined by Information Quality. Yassierli et al. (2019) also concurred, finding a positive and significant relationship between Information Quality and User Satisfaction.

In contrast, Nani and Lina (2022), and Susanti and Mauritsius (2022) found that Information Quality did not have a significant influence on User Satisfaction. Nani and Lina (2022) surmised that the insignificant influence of Information Quality on User Satisfaction could be as a result of users relying on other sources such as customer reviews, news, and social media to get information about products and services sold, rather than the information provided on the mobile applications itself. Susanti and Mauritsius (2022) did not explain the findings.

2.7.2.1 Hypotheses 3 and 4

The findings from previous studies led to the following hypotheses by this study in the context of the mobile commerce application under investigation:

H3: Information Quality (IQ) has a positive relationship with System Use (SU)
   (IQ $\rightarrow$ SU)

H4: Information Quality (IQ) has a positive relationship with User Satisfaction
   (US) (IQ $\rightarrow$ US)

2.7.3 Service Quality

According to Prajapati (2020), Service Quality refers to the degree of expectancy that customers have that a product or service performance will meet their needs and fulfil their expectations. Good customer service can add value to organisations by enhancing the reputation of the organisation amongst its customers. Chenhui (2019) reckons that when customers are satisfied with the Service Quality of an organisation, they remain loyal to it and help attract other customers by recommending it to their friends and family. Under the Service Quality dimension, DeLone and McLean (2003) proposed similar attributes to those proposed by Pitt et al. (1995), which came from SERVQUAL, a marketing literature tool to measure customer service.

Although some researchers have used SERVQUAL to measure e-commerce websites' success, DeLone and McLean (2003) argued that this is not enough to be used alone to measure IS success. They preferred to adopt its characteristics into their updated model (DeLone & McLean, 2003; DeLone & McLean, 2004). Attributes to be measured when assessing Service Quality consist of assurance, empathy, follow-up service, online support, order tracking, responsiveness, reliability, and technical competence (Chenhui, 2019; DeLone & McLean, 2003; DeLone & McLean, 2004; Nani & Lina, 2022; Prajapati, 2020; Shabila & Djamaludin, 2022) as well as the ease of ordering, feedback about consumers' complaints, delivery of products, delivery of services, and returns or exchanges (Sari et al., 2021).

Customers expect a mobile commerce application to perform well when they retrieve information that is delivered to their mobile device. Customers will revisit a mobile application if they are satisfied with how they first experienced the application. Mobile commerce support attributes include the ability to make payments, to track the status of an order, and for customers to manage their accounts, as well as answers to frequently asked questions (Lee et al., 2021; Shabila & Djamaludin, 2022; Usadi et al., 2022).

Table 2.6 provides a summary of the Service Quality attributes discussed above:

TABLE 2.6: SERVICE QUALITY ATTRIBUTES

Dimension	Attributes	Sources
Service Quality	Ability for customers to manage their accounts	Chenhui, 2019
	Ability to make payments	DeLone & McLean, 2003
	Ability to track the status of an order	
	Assurance	DeLone & McLean, 2004
	Delivery of products	
	Delivery of services	Lee et al., 2021
	Ease of ordering	Nani & Lina, 2022
	Empathy	
	Feedback to consumers' complaints	Prajapati, 2020
	Following-up service	Sari et al., 2021
	Frequently Asked Questions	Shabila & Djamaludin, 2022
	Online support	
	Order tracking	Usadi et al., 2022
	Reliability	
	Responsiveness	
	Returns or exchanges	
	Tangible factors	
	Technical competence	

Previous studies made recourse to the DeLone and McLean IS success model to evaluate the success of mobile applications. The results varied when it came to the relationships between Service Quality and System Use along with those between Service Quality and User Satisfaction. For example, Elsdaig and Nassar (2019) found that Service Quality had a positive effect on both System Use and User Satisfaction. This corroborates the findings of Mkinga and Mandari (2020), who used the DeLone and McLean IS success model to evaluate the success of a student mobile application in Tanzania and arrived at the same conclusion.

Consequently, this contradicts the results found by Amalina and Suryani (2020) who utilised the DeLone and McLean IS success model to evaluate the success of an e-invoice mobile application in a state-owned enterprise in Indonesia. Having done so, they noticed that Service Quality had no significant impact on User Satisfaction. They attributed this to the lack of a dedicated technical support team which could not provide support services when users raised issues with the mobile application. Instead, users resported issues directly to the mobile application developer through a ticketing system and receiving feedback as soon as the developer was able to respond. As a result, the quality of service provided was below expectation from users.

Usadi et al. (2022) investigated the impact of System Quality, Service Quality, and Information Quality on the Switching Intention and User Satisfaction of Generation Y users of the Shopee app. After analysing the data using PLS, they found that Service Quality had a significant positive effect on User Satisfaction.

This was partially in contrast with Itthiphone et al. (2020), who adopted the DeLone and McLean IS success model to investigate factors that encouraged mobile payment users in Korea and Loas to continue using the services. Using correlation, they found that for Korean users, Service Quality had a positive effect on User Satisfaction whilst Service Quality had no significant effect on User Satisfaction for Loas users. They supposed that the insignificant effect of Service Quality on User Satisfaction from Loas users could be due to the fact that usage of mobile payment services in Loas was in its early stages as there were only three providers of the services at the time of their study.

This notion was supported by Paramartha et al. (2021), who applied the DeLone and McLean IS success model to examine factors that affected the stickiness of a mobile news application. After analysing data from 76 respondents using PLS-SEM, they found that Service Quality did not affect User Satisfaction. They argued that this might be because of users experiencing service quality problems on mobile news applications which dissatisfied them.

2.7.3.1 Hypotheses 5 and 6

The findings from previous studies led to the following hypotheses by this study in the context of the mobile commerce application under investigation:

H5: *Service Quality (SVQ) has a positive relationship with System Use (SU)*
   (SVQ → SU)

H6: *Service Quality (SVQ) has a positive relationship with User Satisfaction (US)*
   (SVQ → US)

2.7.4 System Use

The success of a system is measured by the extent to which it is used (Hanus & George, 2020). System Use refers to the actual utilisation of the information system, as well as how much its intended users use the system (Rahman & Ekaputri, 2021). The level of use, as well as the manner in which users use the system are also aspects that System Use is concerned with (Mawart & Seprina, 2022). These include the amount of use, the appropriateness of use, the extent of use, the frequency of use, the nature of use, the purpose of use and the quality of use, as well as the context in which the users are using the system (Pratomo et al., 2021).

The nature of use is concerned with what, in particular, the system is being used for and whether or not that contextual use is being met by the system (Sari et al., 2021). System Use "measures everything from a visit to a web site, to navigation within the site, to information retrieval, to execution of a transaction" (DeLone & McLean, 2003, p. 25). Navigation patterns refer to how a website is structured and assisting users to move between related pages (DeLone & McLean, 2004). The number of sites visits is concerned with counting how many people visited the website during specific periods of time (DeLone & McLean, 2004).

The number of transactions executed is concerned with how many functional actions were performed by the users of the system or website (DeLone & McLean, 2004). Mkinga and Mandari (2020) stated that System Use should be measured by the actual use of the system based on evidence such as the system log files, and not just by the reported use, as these do not necessarily correspond. Furthermore, System Use should not only be concerned with the frequency of use but also with the quality of use, context, and intention to use the system (Amalina & Suryani, 2020).

The Intention to Use is an alternative of the System Use dimension, depending on the context of use (Lee et al., 2021). Intention to Use measures the users' intent to reuse the system, and the likelihood that users will frequently use the system in future (Amalina & Suryani, 2020; Lee et al., 2021).

The System Use dimension attributes recommended by DeLone and McLean (2004) are: information search, information retrieval, receiving customer orders, accepting customer payments, customer service requests, purchase orders, payments to vendors, number of site visits, website navigation, length of stay, number of purchases completed, and transaction execution. In mobile commerce, System Use can be divided into (i) transactional and (ii) informational components, which are concerned with customers searching for and obtaining information (Dari & Prahartiwi, 2020).

Table 2.7 provides a summary of the System Use attributes discussed above.

TABLE 2.7: SYSTEM USE ATTRIBUTES

Dimension	Attributes	Sources
System Use	Accepting customer orders	Amalina & Suryani, 2020
	Accepting customer payments	Angelina et al., 2019
	Amount of use	DeLone & McLean, 2003
	Appropriateness of use	DeLone & McLean, 2004
	Context of use	Ebnehoseini et al., 2019
	Customer service requests	Dari & Prahartiwi, 2020
	Extent of use	Hanus & George, 2020
	Frequency of use	
	Frequent future use	Lee et al., 2021
	Information retrieval	Mawart & Seprina, 2022
	Information search	Mkinga & Mandari, 2020
	Intend to reuse	
	Length of stay	Pratomo et al., 2021
	Nature of use	Rahman & Ekaputri, 2021
	Navigation patterns	
	Number of purchases completed	

Dimension	Attributes	Sources
	Number of site visits	Sari et al., 2021
	Number of transactions	
	Number of visits	
	Payments to vendors	
	Purchase orders	
	Quality of use	
	Receiving customer orders	
	Transaction execution	
	Website navigation	

Previous studies used the DeLone and McLean IS success model to evaluate mobile applications, with fluctuating outcomes on the relationships between System Use and User Satisfaction, as well as between System Use and Net Benefits. Elsdaig and Nassar (2019) found that System Use had a positive effect on both User Satisfaction and Net Benefits. This was supported by Sari, et al (2021) who found that System Use had a positive effect on Net Benefits. Both studies were contradicted by Amalina and Suryani (2020) who found that System Use had no significant impact on both User Satisfaction and Net Benefits. Amalina and Suryani (2020) stated that the reason why System Use did not have significant impact on User Satisfaction and Net Benefits was because it was mandatory for users to use the system they were studying. Therefore, even if users used the system many times a day, this did not make them feel more satisfied about the system or perceive using the system to be beneficial.

2.7.4.1 Hypotheses 7 and 8

The findings from previous studies led to the following hypotheses by this study in the context of the mobile commerce application under investigation:

H7: *System Use (SU) has a positive relationship with User Satisfaction (US)*

   (SU → US)

H8: *System Use (SU) has a positive relationship with Net Benefits (NBs)*

   (SU → NBs)

2.7.5 User Satisfaction

User Satisfaction relates to the pleasant or unpleasant feelings information system users feel after interacting with a particular system, as a result of their realising or not realising the expectations they had before interacting with the system (Shabila & Djamaludin, 2022). User Satisfaction measures the combination of positive or negative feelings that users have towards the system after using it.

Users can be satisfied with a single transaction they have performed on the system, which is referred to as 'transactional satisfaction'. Users can also be satisfied with several transactions they performed on the system, which is referred to as 'overall satisfaction' (Shabila & Djamaludin, 2022). User Satisfaction can be measured by looking at the number of repeat purchases performed by the users. Users who are satisfied with a system will come back to use it again in future, hence repeat visits to a system are indicative of the users' satisfaction with the system (Usadi et al., 2022). A useful way for system owners to find out whether their system's users are satisfied with the system is to conduct regular surveys amongst the users so they can receive direct feedback from them (DeLone & McLean, 2004).

To measure User Satisfaction, the variables to be used, according to Itthiphone et al. (2020), are repeat purchases, satisfaction with information retrieval, satisfaction with payment options, satisfaction with receipt of goods and services, and satisfaction with service rendered. Rahman and Ekaputri (2021) measured User Satisfaction based on assessing user information, avoiding developing improper or insignificant features, developing genuine expectations, fostering system ownership by users, and providing expertise support. User Satisfaction "remains an important means of measuring our customers' opinions of our system and should cover the entire customer experience cycle from information retrieval through purchase, payment, receipt, and service" (DeLone & McLean, 2003, p. 25).

Consumers' perception that a mobile application will be able to achieve the intended online transactions can influence the User Satisfaction with the mobile application (Yassierli et al., 2019). Their User Satisfaction and their Intention to Reuse a mobile commerce application are directly impacted by the Information Quality and the Service Quality provided by the mobile commerce application (Yassierli et al., 2019).

Table 2.8 provides a summary of the User Satisfaction attributes discussed above.

TABLE 2.8: USER SATISFACTION ATTRIBUTES

Dimension	Attributes	Sources
User Satisfaction	Assessing user information	DeLone & McLean, 2003
	Avoiding developing improper or insignificant features	Elsdaig & Nassar, 2019
	Developing genuine expectations	Itthiphone et al., 2020
	Fostering system ownership by users	Maulani & Hamdani, 2019
	Providing expertise support	Rahman & Ekaputri, 2021
	Repeat purchases	Usadi et al., 2022.
	Satisfaction with information retrieval	
	Satisfaction with payment options	
	Satisfaction with receipt of goods and services	
	Satisfaction with service rendered	

Previous studies used the DeLone and McLean IS success model to evaluate mobile applications, confirming the relationship between User Satisfaction and Net Benefits. Elsdaig and Nassar (2019) found that User Satisfaction had a positive effect on Net Benefits. This was confirmed by Amalina and Suryani (2020), and Purwati et al. (2021) who also found that User Satisfaction had a positive effect on Net Benefits.

2.7.5.1 Hypotheses 9

The findings from previous studies led to the following hypothesis by this study in the context of the mobile commerce application under investigation:

H9: User Satisfaction (US) has a positive relationship with Net Benefits (NBs)

(US → NBs)

2.7.6 Net Benefits

The Net Benefits dimension is concerned with both positive and negative benefits of implementing an information system to the stakeholders (Shabila & Djamaludin, 2022). "Net Benefits are the most important success measure as they capture the balance of positive and negative impacts of the system on our customers, suppliers, employees, organisations, markets, industries, economies, and even our societies" (DeLone & McLean, 2003, p. 25).

One way to assess the benefits a system provides to its users is to measure the cost savings the users are realising as a result of using the system (Mawart & Seprina, 2022). On a national level, the benefits of using technology can be measured by the increase of the economy of the country (DeLone & McLean, 2003). The benefits of introducing a new system or technology can also be measured by looking at additional sales that have accrued as a result of the new system's being in place (Amalina & Suryani, 2020). Does it take individual users of a system, such as a mobile application, less time and effort to find what they are looking for, such as a product or a service? A positive response to this question indicates the benefit or value the new system is adding to its users (Sorongan & Hidayati, 2020).

Depending on the stakeholder(s) in whose interest the system evaluation is being measured, DeLone and McLean (2004) stated that the Net Benefits dimension can be measured on (i) an individual, (ii) a group, (iii) an organisational, and (iv) an industry level.

Individual benefits include enhanced customer support and services, improved customer knowledge, reduced information search time, improved customer experience, entertainment, reduced shopping costs, and real-time marketing offers (DeLone & McLean, 2004).

Group benefits can be measured in terms of communication effectiveness, improved knowledge sharing, and selling team coordination (DeLone & McLean, 2004).

Organisational benefits can be measured by growth in the customer base; increased sales, market share, profit and return on investment; customer lock-in; competitive advantage; economies of scale; sales process efficiency; productivity; operational excellence; reduced cycle time; global reach; customer loyalty, stickiness, brand awareness, and responsiveness; market responsiveness; customer acquisition and retention; and click-to-buy ratio (DeLone & McLean, 2004).

Industry benefits should be measured by inter-organisational transaction efficiency, supply chain efficiency, cost reductions throughout the supply chain, supply chain integration, synchronisation, improved trading partner relationships, virtual partnerships, inter-organisational coordination, and synergy (DeLone & McLean, 2004).

Below provides a summary of the Net Benefits attributes discussed above.

Dimension	Individual Benefits	Group Benefits	Organisational Benefits	Industry Level Benefits	Source
Net Benefits	• Enhanced customer support and services • Entertainment • Improved customer experience • Improved customer knowledge • Real-time marketing offers • Reduced information search time • Reduced shopping costs	• Communication effectiveness • Improved knowledge sharing • Selling team coordination	• Brand awareness • Click-to-buy ratio • Competitive advantage • Customer acquisition • Customer lock-in • Customer loyalty • Customer responsiveness • Customer retention • Economies of scale • Global reach • Growth in customer base • Increased sales • Market responsiveness • Market share • Operational excellence • Productivity • Profit • Reduced cycle time • Return on investment • Sales process efficiency • Stickiness	• Cost reductions throughout the supply chain • Improved trading partner relationships • Inter-organisational coordination • Inter-organisational transaction efficiency • Supply chain efficiency • Supply chain integration • Synchronisation • Synergy • Virtual partnerships	Al-Fraihat et al., 2020 Amalina & Suryani, 2020 DeLone & McLean, 2003 DeLone & McLean, 2004 Mawart & Seprina, 2022 Shabila & Djamaludin, 2022 Sharma & Sharma, 2019 Sorongan & Hidayati, 2020

TABLE 2.9: NET BENEFITS ATTRIBUTES

2.8   The Study Conceptual Model

Although the Net Benefits realised by the mobile application users could be used to measure its success, DeLone and McLean (2003) stated that this dimension cannot be fully measured without concurrently understanding and measuring the rest of the dimensions proposed by their model. The interconnectedness of the variables of the updated DeLone and McLean IS success model means that the Net Benefits cannot be realised if the rest of the dimensions of the model are not also realised (Monika & Gaol, 2017). System success factors should be measured as a whole, not independently (Seta, Wati, Muliawati, & Hidayanto, 2018). Therefore, this study adopted the updated 2003 DeLone and McLean IS success model and investigated all six of its dimensions in the mobile commerce application context. The proposed study conceptual model is presented in Figure 2.4 below:
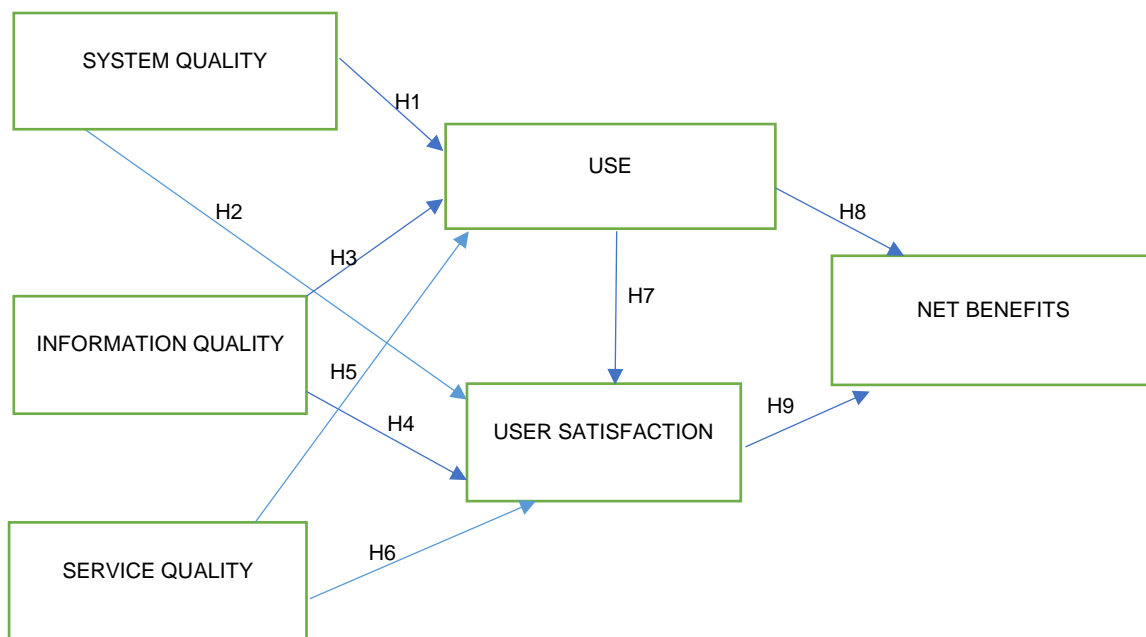
FIGURE 2.4:CONCEPTUAL MODEL

The conceptual model was validated through data collected using the data collection tool described in the Research Methodology chapter. This study therefore sought to add to the existing literature by applying the above conceptual model to evaluate success of the mobile commerce application used as a case study.

2.9 Summary of the chapter

This chapter presented the literature review of previous studies related to this study. Four models / theories, which are TAM, DOI, value-added theories, and the DeLone and McLean IS success model, were considered and the latter was selected to underpin the study. After a detailed discussion of the six dimensions of the selected model and the related proposed hypotheses of this study, a study conceptual model was presented, showing the hypothesised relationships amongst the factors.

The following chapter presents the methodology followed to conduct the research.

Chapter 3.   Research Methodology

3.1 Introduction

This chapter discusses the research methodology that was followed to address the research questions of the study. The study adapted the research onion model (Saunders et al., 2019) to guide the research design and procedures. The research onion model as adapted for this study is presented in Figure 3.1 and discussed in the following subsections:
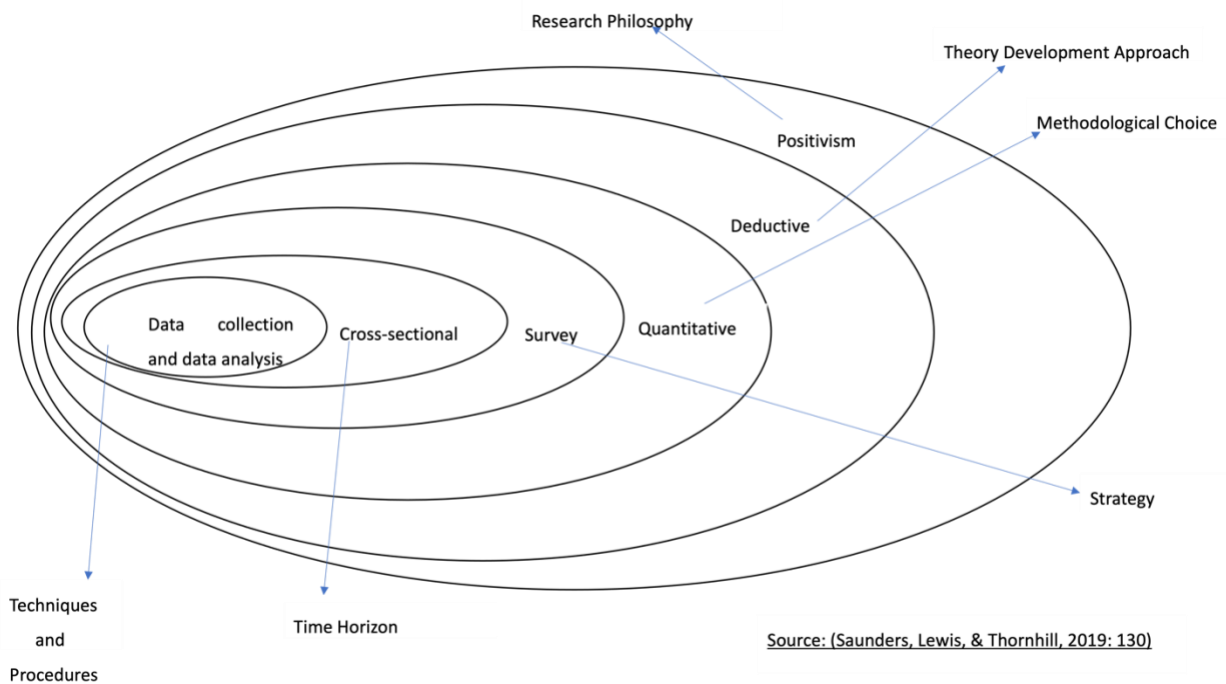
FIGURE 3.1:RESEARCH ONION MODEL

3.2 Research Philosophy

"The term research philosophy refers to a system of beliefs and assumptions about the development of knowledge" (Saunders et al., 2019, p. 130). Amongst some of the most popular research philosophies are positivism, interpretivism, realism, and pragmatism (Saunders et al., 2019). The following paragraphs provide a high-level discussion of each of the aforementioned philosophies.

To begin with, positivism is a philosophy in which the researcher searches for absolute truth and does not get involved with the participants or research subjects being investigated.

Positivists strive to be objective during data collection and analysis, separating their personal beliefs from the entire research process. Positivist philosophy also tests or validates existing theory, with the research process starting from conceptual theory development, moving to data collection, and then to validating the theory (Saunders et al., 2019).

As for interpretivism, Oates (2006) characterises it as a research philosophy based on subjective ontology. This means that its premise sustains the notion that there is no single way to view reality since the production of knowledge depends upon the phenomena being investigated and its context (Oates, 2006). Unlike positivists who seek to substantiate a hypothesis based on objective reality, interpretivists seek to gain deep understanding of the subject being studied in research, accepting that the truth discovered is relative and subjective to the particular context and setting that the subject of investigation is currently under (Oates, 2006).

In realism, researchers are influenced by their own experiences and worldviews yet they believe, at the same time, that their senses will show them the truth given that reality exists independently from the mind (Saunders & Tosey, 2012). As indicated by Saunders et al. (2019), there are two types of realisms: direct realism and critical realism. Direct realism provides an accurate representation that is regulated by what researchers experience through their senses. Whereas with critical realism, the mind subjectively processes what was initially experienced through the researcher's senses before accurate representation is achieved (Saunders et al., 2019).

With respect to pragmatism, researchers believe that there are multiple realities as there is no single viewpoint that can give the whole picture. In this philosophy, it is the practical consequences of the research findings that are key. The aim is to resolve a problem with practical solutions that may influence practice in future. Pragmatists believe that there are many ways to conduct research and to interpret the world (Saunders & Tosey, 2012; Saunders et al., 2019).

Going further, it has been established that research philosophy is able to locate the ontological, epistemological, and axiological perspectives that influence the worldview of a researcher (Creswell & Creswell, 2018; Leavy, 2017; Saunders et al., 2019).

To sum it up: ontological assumptions and beliefs are concerned with the nature of reality, and whether or not there is a way of looking at the reality around us without taking into account the contextual considerations (Leavy, 2017; Saunders et al., 2019). Epistemological assumptions and beliefs are concerned with the acceptability, validity, and legitimacy of knowledge (Leavy, 2017; Saunders et al., 2019). Axiological assumptions and beliefs are concerned with the ethics and values of the researcher, and whether or not these should influence the research (Saunders et al., 2019).

Having considered all of the above, this study was grounded in the positivism philosophy because it sought to prove hypotheses based on objective reality through the collection and analysis of quantitative data. The researcher did not become directly involved with the participants of the study. This researcher's ontological assumption is that there is one reality, which is external to the researcher; hence the researcher was detached from the research in line with the positivism philosophy. Epistemologically, this researcher believes that knowledge can be measured using reliable tools and designs; hence the use of statistical techniques to validate the data collected in this study. Axiologically, this researcher remained neutral throughout the process of conducting the research, without letting his personal views influence the results of the research.

3.3 Theory Development Approach

A deductive approach was followed in this study as the researcher adopted the DeLone & McLean (2003) model and tested it in the context of of evaluating the success of a mobile commerce application. "Deductive reasoning occurs when the conclusion is derived logically from a set of theory-derived premises, the conclusion being true when all the premises are true" (Saunders et al., 2019, p. 152). The conceptual model proposed in this study is adopted from the updated DeLone and McLean IS success model (DeLone & McLean, 2003), to test the hypothesized causal relationships between the six constructs of the model in the context of the mobile commerce application being evaluated. The data collected in the study were interpreted and analysed using statistical formulas to evaluate the hypotheses derived from the theory. The outcome validated the assertions of the updated DeLone and McLean IS success model as applied on the data collected in this study.

3.4 Methodological Choice

There are three main research methods that are generally used when doing research: quantitative methods, qualitative methods, and mixed methods (Creswell & Creswell, 2018; Leavy, 2017; Saunders et al., 2019).

Quantitative methods are mainly used in research that validates, tests, proves, or disproves existing theory through the collection of numerical data (Creswell & Creswell, 2018; Leavy, 2017; Saunders et al., 2019). Quantitative methods are mostly associated with a deductive approach to theory development, finding the cause-and-effect relationships between variables (Creswell & Creswell, 2018; Leavy, 2017; Saunders et al., 2019). Quantitative methods generally deal with numerical data such as numbers, number ranges, and statistical data (Saunders et al., 2019), and are most appropriate when the purpose of a research is to evaluate a phenomenon or explain its effectiveness (Leavy, 2017).

Using quantitative methods, this study evaluated the success of a mobile commerce application in streamlining customer self-services for its users as well as the effectiveness of the mobile application in fulfilling its purpose.

3.5 Research Strategy

This study collected data in the form of a survey. An online self-administered questionnaire was electronically sent to each prospective respondent. The collected data were analysed using statistical instruments to give more meaning to what was observed from the data. Table 3.1 presents the operationalisation of the data collection instrument, describing what data were collected in each section. The operationalisation is based on the study conceptual model presented in Chapter 2. The data collection questions were derived from the literature. The full data collection instrument showing all the questions with a Likert scale is presented in Appendix D.

Table 3.1:   Data Collection Instrument Operationalisation

Section	Construct	Item	Wording	Reference
Section A	Demographic Information	DI1	Gender	This study
		DI2	Age group	
		DI3	Level of education	
		DI4	How often do you use the mobile application of the organisation?	
Section B	System Quality		The mobile app….	Kurt et al., 2022
		SQ1	has necessary features and functions	Nani & Lina, 2022
		SQ2	is functional	Rahman & Ekaputri, 2021
		SQ3	is usable	Susanti & Mauritsius, 2022
		SQ4	is easy to use	Yoo, 2020
		SQ5	is easy to learn	
		SQ6	is available whenever I want to use it	
		SQ7	is reliable – it is error/bug free and does not crash in the middle of transactions	
		SQ8	has a good response time	
		SQ9	has an appealing visual appearance	
		SQ10	has a simple interface design that makes it easy to navigate within the app	
		SQ11	makes it is easy to access information needed on it (not too many clicks)	

Section	Construct	Item	Wording	Reference
Section C	Information Quality		In terms of the products (e.g., cell phones) and services (e.g., airtime or data) offered, the mobile app gives…	Anggraeni & Sanjaya, 2021
		IQ1	useful information	Isnaeningsih et al., 2021
		IQ2	relevant information	Itthiphone et al., 2020
		IQ3	accurate information	Kurt et al., 2022
		IQ4	up to date information	Malada, 2022
		IQ5	timely information	Mkinga & Mandari, 2020
		IQ6	complete information	Purwati et al., 2021
		IQ7	concise information	Shabila & Djamaludin, 2022
		IQ8	understandable information	Susanti & Mauritsius, 2022
		IQ9	well formatted information	
		IQ10	personalised information	
Section D	Service Quality		The mobile app….	Chenhui, 2019
		SVQ1	has teach-yourself help tutorials	Lee et al., 2021
		SVQ2	allows me to buy products and services online	Nani & Lina, 2022
		SVQ3	allows me to make payments for my products and services	Prajapati, 2020
		SVQ4	allows me to request my products to be delivered to my address	Sari et al., 2021
		SVQ5	allows me to track the status of my orders	Shabila & Djamaludin, 2022
		SVQ6	allows me to report and track issues	Usadi et al., 2022
		SVQ7	allows me to chat with a service support agent to resolve my reported issues	
		SVQ8	provides frequently asked questions, which help me quickly find resolutions to my issues	

Section	Construct	Item	Wording	Reference
Section E	System Use		The mobile app….	Angelina et al., 2019
		SU1	is easy to navigate around	Amalina & Suryani, 2020
		SU2	is easy to use to complete transactions	Dari & Prahartiwi, 2020
		SU3	is easy to use to search and find products and services	Ebnehoseini et al., 2019
		SU4	is easy to use to order of products and services	Hanus & George, 2020
		SU5	is easy to use to make payments for products and services ordered	Lee et al., 2021
		SU6	is easy to use to track the status of orders	Mawart & Seprina, 2022
		SU7	is easy to use to report issues	Mkinga & Mandari, 2020
		SU8	is easy to use when performing different transactions	Pratomo et al., 2021
		SU9	I intend to reuse the mobile app in future	Rahman & Ekaputri, 2021
				Sari et al., 2021
Section F	User Satisfaction		I am satisfied...	Elsdaig & Nassar, 2019
		US1	with the features of the mobile app	Maulani & Hamdani, 2019
		US2	that the mobile app meets my online transaction needs	Itthiphone et al., 2020
		US3	that the mobile app meets my online transaction expectations	Rahman & Ekaputri, 2021
		US4	that the mobile app has improved my access to products and services offered	Usadi et al., 2022
		US5	with the retrieval of products and services in the mobile app	
		US6	with the payment options provided in the mobile app	
		US7	with the receipt of goods and services purchased using the mobile app	
		US8	with the self-help support rendered in the mobile app	
		US9	with the support provided by the mobile app service provider when dealing my reported issues	
		US10	with the way in which my information is presented in the mobile app	
		US11	with the general performance of the mobile app	

Section	Construct	Item	Wording	Reference
Section G	Net Benefits		The mobile app….	Al-Fraihat et al., 2020
		NBs1	reduces my time to search for products and services as I can easily locate them on the app	Amalina & Suryani, 2020
		NBs2	reduces my costs of shopping for products and services as I do not need to physically go to the mobile app service provider store	Mawart & Seprina, 2022
		NBs3	enables me to make more informed purchase decisions on products and services offered	Shabila & Djamaludin, 2022
		NBs4	timeously markets products and services relevant to my shopping needs	Sharma & Sharma, 2019
		NBs5	gives me access to advertised products and services	Sorongan & Hidayati, 2020
		NBs6	improves my customer experience	

The data collection instrument had eight sections – A to G.

Section A covered the demographic information of the respondents, such as gender, age group, level of education, and the number of times respondents used the organisation's mobile application during the period under investigation.

Section B had 11 questions dealing with the System Quality dimension. They were adapted from 5 previous studies (Kurt et al., 2022; Nani & Lina, 2022; Rahman & Ekaputri, 2021; Susanti & Mauritsius, 2022; Yoo, 2020).

Section C's 10 questions dealt with the Information Quality dimension and were adapted from 9 previous studies (Anggraeni & Sanjaya, 2021; Isnaeningsih et al., 2021; Itthiphone et al., 2020; Kurt et al., 2022; Malada, 2022; Mkinga & Mandari, 2020; Purwati et al., 2021; Shabila & Djamaludin, 2022; Susanti & Mauritsius, 2022).

Section D asked 8 questions dealing with the Service Quality dimension of the model. They were adapted from 7 previous studies (Chenhui, 2019; Lee et al., 2021; Nani & Lina, 2022; Prajapati, 2020; Sari et al., 2021; Shabila & Djamaludin, 2022; Usadi et al., 2022).

Section E asked 9 questions that were aimed at determining the System Use dimension and were adapted from 9 previous studies (Amalina & Suryani, 2020; Angelina et al., 2019; Dari & Prahartiwi, 2020; Ebnehoseini et al., 2019; Hanus & George, 2020; Lee et al., 2021; Mawart & Seprina, 2022; Mkinga & Mandari, 2020; Pratomo et al., 2021; Rahman & Ekaputri, 2021; Sari et al., 2021).

Section F covered the User Satisfaction dimension, asking 11 questions from 5 previous studies (Elsdaig & Nassar, 2019; Itthiphone et al., 2020; Maulani & Hamdani, 2019; Rahman & Ekaputri, 2021; Usadi et al., 2022).

Section G dealt with the Net Benefits dimension, with 6 questions adapted from 6 previous studies (Al-Fraihat et al., 2020; Amalina & Suryani, 2020; Mawart & Seprina, 2022; Shabila & Djamaludin, 2022; Sharma & Sharma, 2019; Sorongan & Hidayati, 2020).

3.6 Time Horizon

As explained by Saunders et al. (2019), research can either be carried out within a cross-sectional time horizon (over a short period of time) or it can be carried out within a longitudinal time horizon (over a long period of time). For the specific purposes of this study, the cross-sectional time horizon was especially selected in order to meet the academic requirements for the research degree. In this regard, the data for this study was collected during a period of approximately four months.

3.7 Techniques and Procedures

3.7.1 Population and sampling

The respondents targeted for the investigation were sampled from users of a South African mobile telecommunications company's mobile application, aged 18–65 years. There are two main sampling approaches that can be used to sample a population: probability sampling and non-probability sampling (Saunders et al., 2019). A probability sampling approach was used to select targeted respondents for this study. This sampling approach is generally associated with survey research strategy. It is the appropriate sampling approach if statistical instruments are to be used to analyse the data collected, and probability inferences are to be made from the relationships observed (Saunders et al., 2019). A questionnaire was sent to all 300 users of the mobile application who were in the database made available to the researcher by the company. A minimum sample size of 168 responses was targeted from the population of 300, based on the sample size calculation table recommended by Saunders et al. (2019), as shown in Table 3.2.

Table 3.2:   Sample Sizes for Different Target Population Sizes

Target population	Margin of error			
	5%	3%	2%	1%
50	44	48	49	50
100	79	91	96	99
150	108	132	141	148
200	132	168	185	196
250	151	203	226	244
300	168	234	267	291
400	196	291	343	384
500	217	340	414	475
750	254	440	571	696

Target population	Margin of error			
	5%	3%	2%	1%
1000	278	516	706	906
2000	322	696	1091	1655
5000	357	879	1622	3288
10,000	370	964	1936	4899
100,000	383	1056	2345	8762
1,000,000	384	1066	2396	9513
10,000,000	384	1067	2400	9595

(Source: Saunders et al., 2019, p. 302)

3.7.2 Data Collection

An online self-administered questionnaire was developed on SurveyMonkey with a Likert scale of 1 to 5 (where 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree) and sent via email to the target population.

The questionnaire was initially sent to 15 respondents on 28 November 2021 for pilot testing of the research design, to check the readability and understandability of the pre-defined statements and multiple-choice response options. Three of the 15 pilot respondents provided some basic suggestions on the labelling of the pre-defined Likert scale response options. One participant suggested that all expected responses be made mandatory, with a descriptive error message should some respondents skip some of the questions without selecting a response. The labelling suggestion, which related to both the number of the expected responses and the text value (i.e., 1 = Strongly Disagree, 2 = Disagree, etc., instead of just Strongly Disagree, Disagree, etc.) was incorporated. No action was taken about the suggestion to make all responses mandatory because this was already applied to all questions, denoted with an asterisk, and with an error message on skipped questions.

On 1 December 2021, the questionnaire was sent to the remainder of the 300 prospective respondents. The survey was left open until the targeted number of responses was reached, and the data were extracted from SurveyMonkey. From the 178 responses received, only 168 were complete and usable. This dropped the response rate from an initial of 59% to 56%. Therefore, the final response rate of the study was 56%, which is acceptable according to Saunders and Tosey (2012).

Data were cleaned by removing responses that did not cover all the questions. As the data collection instrument had precise response options for each question, there were no responses that did not conform to the expected answers. Therefore, no further data cleaning was performed on the collected data.

Once data had been cleaned, it was coded by replacing the default text value saved in the data file with its corresponding numerical value as assigned in the data collection instrument. For example, the gender responses of 'Male' or 'Female' were replaced with a 1 or 2 respectively. Also, the Likert scale text value responses were replaced with their corresponding numerical values (e.g., Strongly Disagree with 1, Disagree with 2, etc.). The coded data were imported into SPSS for further analysis.

3.7.3 Data Analysis and Interpretation

The first level of analysis focused on respondents' demographic information as collected in Section A of the questionnaire. A consolidated table was used to present the data, showing the breakdown, and spread in terms of gender, age, job title, level of education, and frequency of use of the mobile application under investigation.

The second level of analysis performed was the description of statistics of the six constructs adopted from the DeLone and McLean IS success model (DeLone & McLean, 2003) to produce this study conceptual model. The range of mean scores was reported, highlighting the constructs with the lowest and highest means scores with their standard deviations respectively.

The third level of analysis performed was testing for data normality using shapiro-wilk test, and skewness and kurtosis statistical analysis. The results indicated that data in this study was not normally distributed and therefore there was a need to use partial least squares-structural equation modelling (PLS-SEM).

3.7.4 Structural equation modelling

Structural equation modelling (SEM) was used to further analyse the data and test the hypothesised structural relationships between the constructs in the study model. SEM is a statistical analysis technique used to analyse the structural relationships between latent variables.

SEM was performed using the partial least squares path modelling approach. The latter is a broad concept for analysing blocks and variables, where one considers some previous knowledge of the phenomenon under analysis. It is assumed that each block of variables plays the role of a theoretical concept represented by the latent variables. (Sanchez, 2013; Thakkar, 2020).

The SEM process has two parts, namely a measurement model evaluation and a structural model assessment. Measurement model evaluation is aimed at evaluating the validity and reliability of the manifest variables. The structural model assessment is performed to determine the model's explanatory power to test the hypothesis developed about the relationships among the constructs. (Hussein & Baharudin, 2017).

3.7.5 Validity and Reliability

To measure the quality of a research project and the appropriateness of the design tools employed, the research should stand the test of validity and reliability (Saunders et al., 2019).

Validity is concerned with whether the measures applied in a study are appropriate to achieve the objectives of the study, whether the data are analysed correctly, and whether the study can be generalised. Three aspects of validity are measurement validity, internal validity, and external validity (Saunders et al., 2019).

Measurement validity is concerned with the validity of the measurement tool through examining different types of validity such as face validity, content validity, construct validity, and criterion validity. *Internal validity* is concerned with whether the results observed are scientifically significant, without the influence of any other unknown external phenomenon. *External validity* is concerned with the generalisation aspect of the results found by the study. (Saunders et al., 2019).

Face validity, which is concerned with how measurement items seem to be measuring what is intended to be measured from a language and analytics perspectives was done through the judgement of the researcher after reading the literature, and an experienced statistician, in line with the recommendations of Taherdoost (2016).

Content validity, which is concerned with the relevance and representativeness of measurement items to the target constructs they are grouped under was achieved through the use of the same items used in the literature by previous studies that employed the same constructs as this study, and through the expert assessment of an experienced statistician (Taherdoost, 2016).

The data collection instrument was pilot tested for both face and content validity prior to the collection of data. Based on the feedback from the pilot study which did not lead to major changes of the questionnaire that was designed for this study, it can be argued that the data collection instrument achieved both face validity and content validity.

Following the data collection and cleaning, construct validity was tested on the 168 responses that were initially deemed suitable for further analysis. Construct validity was conducted by looking at both discriminant validity and convergent validity through the examination of component factor analysis as recommended by Taherdoost (2016).

Discriminant validity is concerned with how much the measurement items of different constructs minimally correlate with each other whilst *convergent validity* is concerned with how much the measurement items of the same construct strongly correlate with each other (Taherdoost, 2016).

To satisfy construct validity, factor analysis using principal component analysis (PCA) and varimax rotation method need to be carried out. Factors need to load at least 0.40 with no factors cross loading above 0.40 for discriminant validity, whilst factors with eigenvalues of 1, with loading of atleast 0.40 for convergent validity (Taherdoost, 2016).

Factors that met both construct validity subtypes (i.e discriminant validity and convergent validity) criteria as described above were considered for further analysis. Seven items were deleted as they did not meet the criteria, reducing the initial 168 valid responses to 161. Based on the ten times rule which states that 10 responses need to be collected for every path of a research model (Hair, Hult, Ringle, & Sarstedt, 2016), 161 responses were still acceptable as they are more than the 90 needed for this study since the study research model has 9 paths.

Reliability refers to the consistency and replicability of the research design proposed by the researcher (Edmonds & Kennedy, 2017; Jenkins-Smith, Ripberger, Copeland, Nowlin, Hughes, Fister, & Wehde, 2017; Saunders et al., 2019). Two types of reliability to consider are internal reliability and external reliability.

Internal reliability can be achieved by employing more than one researcher to collect and analyse data then comparing how close the different researchers' results are to each other (Saunders et al., 2019). Since this study was conducted by one researcher, internal reliability was measured by assessing how the different inter-items of each of the dimensions correlate to each other, using Cronbach's alpha (Edmonds & Kennedy, 2017; Jenkins-Smith et al., 2017).

External reliability refers to the ability of other researchers to follow the same research methodological choices employed by the researcher, and produce the same results (Edmonds & Kennedy, 2017; Jenkins-Smith et al., 2017; Saunders et al., 2019). This researcher strongly believes that if another researcher followed the same literature analysis method, research methodology, and conceptual model proposed in this study, similar results can be reproduced.

3.8 Ethical clearance procedures

Some ethical considerations were observed to ensure that the study followed strict ethical and moral standards. This started by obtaining ethical clearance from the university through which this study was undertaken, i.e., the University of South Africa (Unisa). The ethical clearance certificate can be seen in Appendix E.

Permission to conduct the research on the identified organisation's mobile application was obtained from the chief information and technical officer of the organisation, as shown in Appendix B. It was a strict condition that the name of the organisation should not be divulged, hence the company name and any information that could reveal the identity of the organisation has been masked in both Appendix A and Appendix B.

The researcher informed respondents, through the survey cover letter shown in Appendix C, that their participation in the study was voluntary, assuring them that their personal details and responses would be used solely for the purposes of this study.

The researcher also assured respondents that the data collected from them would be kept confidential, and their identities would be protected from any potential exposure that could harm them, directly or indirectly.

3.9 Summary of the chapter

This chapter presented the research methodology of this study, which adapted the research onion model. Positivism was selected as the philosophical paradigm underpinning the study. Quantitative research methods were used to collect and analyse data. A survey was the strategy of choice to collect data using a self-administered questionnaire that was emailed to the target population identified by the researcher. Structural equation modelling was used to analyse the collected data and to test the proposed theories.

The next chapter presents the study results.

Chapter 4.   Data Analysis and Results

4.1 Introduction

This chapter deals with the analysis of the data and the presentation of the results. Frequencies and descriptive analysis were performed on the collected data to obtain an overview of the responses. The data were tested for normality, reliability, and validity. Lastly, structural equation modelling was employed to analyse the data and test the proposed hypothesis of the study.

4.2 Participants demographics

Table 4.1 presents the general characteristics of the study respondents. A total of 161 valid responses were analysed. The respondents were 43.5% (70) female and 56.5% (91) male, with the age of most respondents falling between 35–44 years (43.5%), and only 0.6% (1) was over the age of 65 years. Respondents were asked to indicate their level of education based on five categories: 42.2% (68) of them had a post graduate degree and 3.1% (5) had a post matric certificate. Lastly, respondents were asked to indicate how often they had used the mobile application of the telecommunications services provider where the study was conducted, in the preceding four months from the time they were responding to the questionnaire. 42.9% (69) indicated that they had used the mobile application daily, whilst 7.5% (12) indicated that they had used the mobile application at least once a week.

TABLE 4.1: GENERAL CHARACTERISTICS OF RESPONDENTS (N = 161)

Characteristics	Categories	Total	Percentage
Gender	Female	70	43.5%
	Male	91	56.5%
Age	18–24	8	5.0%
	25–34	38	23.6%
	35–44	70	43.5%
	45–54	37	23.0%
	55–64	7	4.3%
	65+	1	0.6%
Level of Education	Matric	7	4.3%
	Post Matric Certificate	5	3.1%

Characteristics	Categories	Total	Percentage
	Post Matric Diploma	30	18.6%
	Bachelor's Degree/B-Tech	51	31.7%
	Postgraduate Degree	68	42.2%
Mobile App Use Frequency	Daily	69	42.9%
	A few times per week	19	11.8%
	Weekly	12	7.5%
	2–3 times per month	24	14.9%
	Monthly	17	10.6%
	Not consistently	20	12.4%

4.3 Description of statistics of constructs

Table 4.2 provides descriptive statistics of the six constructs adopted from the DeLone and McLean IS success model (DeLone & McLean, 2003), i.e., System Quality, Information Quality, Service Quality, System Use, User Satisfaction, and Net Benefits, as they relate to this study. For each construct, respondents were asked to respond to a list of items based on the characteristics of the dimension as developed from the literature, using a Likert scale ranging from 1–5, where 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

The range of mean scores was 3.6366 to 4.0994. Service Quality had the lowest mean score (Mean=3.6366, Standard Deviation=0.83081). Information Quality had the highest mean score (Mean=4.0994, Standard Deviation=0.63618). This suggests that the respondents did agree with each other on the choice variables for each construct as displayed in Table 4.2.

Table 4.2:   DESCRIPTIVE STATISTICS

Descriptive Statistics (N =161)				
Constructs	Minimum	Maximum	Mean	Standard Deviation
System Quality	1.00	5.00	4.0736	0.71964
Information Quality	1.00	5.00	4.0994	0.63618
Service Quality	1.00	5.00	3.6366	0.83081
System Use	1.00	5.00	3.9068	0.72955

Descriptive Statistics (N =161)				
User Satisfaction	1.00	5.00	3.8718	0.77796
Net Benefits	1.00	5.00	3.7867	0.86767

4.4 Data Normality

Data normality was tested using statistical analysis which are shapiro-wilk test, and skewness and kurtosis. The results of shapiro-wilk test indicated that the decision variables have the values of 0.00 which is less than 0.05 as a p-value. The results indicated that data from the test is not normally distributed. The test of skewness and kurtosis also illustrates that data is not normally distributed as it falls outside the recommended threshold of - 1 and +1 (Field, 2013). This implies that data in this study was not normally distributed and therefore there was a need to use partial least squares-structural equation modelling (PLS-SEM).

4.5 Structural Equation Modelling

SEM was used to test the hypothesized structural relationships between the constructs on the study model. Measurement model evaluation evaluated the consistency and validity of the manifest variables. Consistency evaluations were measured through individual manifest and construct reliability tests. While validity of the variables was tested based on convergent and discriminant validity, individual manifest reliability explained the variance of the individual manifest relative to latent variable calculating standardised outer loading of the manifest variable (Sanchez, 2013). PLS-SEM was used in this study to validate and test for reliability of the measurement model, using construct validity, and indicator reliability.

4.5.1 Measurement Model Evaluation

The measurement model was evaluated using the Smart PLS version 4 package.

4.5.1.1 Face and Content Validity

The measurement items' precision in measurement and interpretation is a concern with face and content validity (Taherdoost, 2016). By ensuring that the assessment items in this study accurately tested the theoretical constructs they were intended to evaluate, face and content validity were confirmed. This was accomplished by utilizing previously proven materials that were adjusted to match the needs of this study.

The survey instrument was pilot tested for face and content validity, and the final instrument was adjusted in response to feedback from the pilot testing.

4.5.1.2 Indicator Reliability

Item loading was employed in this study to assess the measurement model's indication of reliability. According to Hussein and Baharudin (2017), an item needs to have a loading of at least 0.7 in order to have adequate indication dependability. Items having loadings of less than 0.7 were excluded, and those with satisfactory loadings are listed on Table 4.4. These items were suitable for use in the study at p value of less than 0.005, all items were significant. Variables such as IQ10, SQ1, SQ6, SQ7, SQ8, SVQ2, and SVQ3 were eliminated since their values were below the threshold.

4.5.1.3 Convergent Validity

Convergent validity is normally used to evaluate the relationship between the scales used to measure a construct as well as other scales which are expected to measure similar constructs (Hussein & Baharudin, 2017). In this study, the convergent validity of the measurement model was evaluated by using the Average Variance Extracted (AVE). Table 4.3 illustrates the AVE of the decision variables. All AVE values are greater than the acceptable threshold value of 0.5 (Ravand & Baghei, 2016). This means that the convergent validity of the measures has been acceptable for this study.

Table 4.3:   AVERAGE VARIANCE EXTRACTED OF CONSTRUCTS

Constructs	Average variance extracted (AVE)
Information Quality	0,668
Net Benefits	0,765
System Quality	0,690
System Use	0,644
Service Quality	0,646
User Satisfaction	0,707

The factors loading of each item was also examined in order to evaluate the convergent validity of the measurement model. The results of the cross loading on Smart PLS are displayed in Table 4.4. For an appropriate convergent validity, each factor loading should

be greater than 0.7 (Hussein & Baharudin, 2017) and the measures of constructs must correlate more highly with their own items, not with the items of other constructs (Ravand & Baghei, 2016). In this study, Table 4.4 illustrates that the measures of constructs correlate more highly with their own items and not with the items of other constructs.

TABLE 4.4: CROSS LOADINGS OF CONSTRUCTS

Component Items	IQ	NBs	SQ	SU	SVQ	US
IQ1	0,785	0,527	0,508	0,569	0,489	0,567
IQ2	0,850	0,572	0,617	0,612	0,474	0,624
IQ3	0,842	0,447	0,503	0,543	0,344	0,551
IQ4	0,858	0,483	0,523	0,564	0,385	0,576
IQ5	0,830	0,521	0,518	0,580	0,421	0,578
IQ6	0,818	0,523	0,666	0,582	0,502	0,664
IQ7	0,819	0,450	0,642	0,539	0,409	0,597
IQ8	0,832	0,617	0,678	0,680	0,519	0,712
IQ9	0,711	0,507	0,593	0,558	0,454	0,628
NBs1	0,608	0,894	0,675	0,760	0,655	0,741
NBs2	0,552	0,893	0,604	0,668	0,583	0,708
NBs3	0,478	0,873	0,531	0,675	0,587	0,699
NBs4	0,529	0,898	0,604	0,733	0,613	0,750
NBs5	0,514	0,827	0,564	0,675	0,596	0,701
NBs6	0,629	0,860	0,637	0,749	0,627	0,781
SQ10	0,563	0,638	0,856	0,696	0,519	0,665
SQ11	0,663	0,617	0,787	0,670	0,539	0,650
SQ2	0,598	0,455	0,817	0,577	0,414	0,590
SQ3	0,648	0,549	0,871	0,629	0,513	0,667
SQ4	0,601	0,599	0,891	0,665	0,490	0,660
SQ5	0,522	0,534	0,794	0,551	0,394	0,551
SQ9	0,547	0,617	0,792	0,606	0,470	0,630
SU1	0,635	0,595	0,728	0,734	0,523	0,728
SU2	0,620	0,685	0,701	0,849	0,571	0,748
SU3	0,539	0,725	0,610	0,847	0,618	0,715
SU4	0,552	0,724	0,621	0,879	0,656	0,773
SU5	0,508	0,574	0,519	0,795	0,557	0,651
SU6	0,475	0,679	0,574	0,826	0,730	0,723

Component Items	IQ	NBs	SQ	SU	SVQ	US
SU7	0,505	0,561	0,471	0,716	0,694	0,655
SU8	0,681	0,648	0,614	0,803	0,673	0,770
SU9	0,632	0,657	0,625	0,756	0,546	0,694
SVQ1	0,416	0,553	0,418	0,586	0,773	0,563
SVQ4	0,513	0,664	0,540	0,691	0,796	0,696
SVQ5	0,459	0,601	0,507	0,674	0,860	0,656
SVQ6	0,419	0,486	0,423	0,606	0,835	0,590
SVQ7	0,402	0,536	0,448	0,574	0,773	0,608
SVQ8	0,403	0,525	0,434	0,581	0,783	0,596
US1	0,679	0,741	0,690	0,765	0,619	0,838
US10	0,639	0,683	0,729	0,711	0,577	0,823
US11	0,612	0,716	0,625	0,703	0,608	0,835
US2	0,659	0,736	0,676	0,794	0,687	0,911
US3	0,663	0,733	0,688	0,834	0,716	0,896
US4	0,584	0,719	0,627	0,763	0,624	0,840
US5	0,704	0,697	0,661	0,750	0,610	0,862
US6	0,642	0,667	0,621	0,760	0,606	0,798
US7	0,637	0,734	0,642	0,798	0,671	0,876
US8	0,547	0,677	0,542	0,742	0,721	0,811
US9	0,525	0,610	0,510	0,637	0,682	0,747
Eigenvalue	3,017	1,093	26,056	1,669	1,944	1,330
Variance Extracted	6,285	2,276	54,283	3,477	4,050	2,771
Cumulative Variance%	6,285	8,561	62,844	66,321	70,371	73,142

4.5.1.4 Discriminant validity

Discriminant validity, which shows how distinct a given construct is from the other constructs (Ravand & Baghei, 2016) was examined. The Fornell and Larcker (1981) criterion which states that the AVE must be greater than the squared construct correlations, was used to establish discriminant validity. Table 4.5 indicates that the diagonal values are greater than any of the inter-correlations between the constructs, confirming the discriminant validity of each of the constructs. The diagonal values represent the AVE for the respective constructs and off-diagonal values represent the squared inter-correlation between the respective constructs. Discriminant validity in this

study was assessed by comparing the values of the AVE as well as the correlation between constructs in order to determine whether the correlation between pairs of constructs is below the threshold value of 0.9 as shown in Table 4.5.

TABLE 4.5: DISCRIMINANT VALIDITY

Constructs	IQ	NBs	SQ	SU	SVQ	US
IQ	**0,817**					
NBs	0,631	**0,875**				
SQ	0,712	0,689	**0,831**			
SU	0,710	0,812	0,756	**0,802**		
SVQ	0,542	0,697	0,574	0,770	**0,804**	
US	0,746	0,835	0,760	0,894	0,769	**0,841**
Diagonal elements represented in bold is the square root of the AVE. Off diagonal elements are the inter-construct correlations						

Note: SQ = System Quality, IQ = Information Quality, SVQ = Service Quality, SU = System Use, US = User Satisfaction, NBs = Net Benefits

4.5.1.5 Internal consistency reliability

In order for the measurement model to have a satisfactory internal consistency reliability, the composite reliability of each decision variable must be equal or higher than 0.70 (Sanchez, 2013). In this study, the composite reliability for each decision variable as shown in Table 4.6 was higher than 0.70 in each case. This illustrates an acceptable reliability, indicating homogeneity amongst the grouped variables as stated by Sanchez (2013).

TABLE 4.6: COMPOSITE RELIABILITY

Constructs	Composite reliability
Information Quality	0,939
Net Benefits	0,939
System Quality	0,927
System Use	0,933
Service Quality	0,892
User Satisfaction	0,960

4.5.1.6 Reliability of constructs

Cronbach's alpha coefficient was carried out to evaluate how suitable the indicators measure their corresponding latent construct and to test the internal consistency amongst the grouped variables. Table 4.7 illustrates that the Cronbach's alpha for all the decision variables were above the minimum threshold of 0.7, which showed the internal consistency of the items of this study (Pallant, 2020).

This means that the component items were reliable and tested the same phenomena, and that the responses were consistent in this study (Pallant, 2020).

TABLE 4.7: CONSTRUCTS RELIABILITY

Constructs	Cronbach's alpha
Information Quality	0,937
Net Benefits	0,938
System Quality	0,925
System Use	0,930
Service Quality	0,890
User Satisfaction	0,958

4.6 Structural model assessment

In PLS, the structural model denotes the relationships between latent variables (Thakkar, 2020). Determining the path coefficients and the R2 value is part of assessing the structural model (Hair, Ringle, & Sarstedt, 2014). Path coefficients define the strength of the correlations between dependent and independent variables, whereas the value of R2 indicates the model's ability to predict dependent variables (Sanchez, 2013). It is vital to ensure that the significance test have statistical power as they have no use otherwise because you cannot differentiate between Hypotheses 0 and alternative Hypothesis 1 (Hair, Ringle, & Sarstedt, 2014; Sanchez, 2013; Thakkar, 2020).

Table 4.8 indicates the results of the structural model. The path between System Quality and System Use is significant and positive ($\beta = 0.334$, $p < 0.05$) supporting hypothesis 1. As expected in the study, System Quality is significantly associated with User Satisfaction ($\beta = 0.116$, $p < 0.05$) thereby supporting hypotheses 2. The relationship between Information Quality and System Use is significant and positive ($\beta = 0.227$, $p < 0.05$), therefore hypothesis H3 is supported.

There is significant and positive relationship between Information Quality and User Satisfaction (β = 0.182, p < 0.05), therefore hypothesis 4 is supported. The path between Service Quality and System Use is significant and positive (β = 0.457, p < 0.05) hence hypothesis 5 is supported. Service Quality positively influences User Satisfaction (β = 0.201, p < 0.05), supporting hypothesis 6. The path between System Use and User Satisfaction is significant and positive (β = 0.521, p < 0.05), supporting hypothesis 7. The influence of System Use on Net Benefits is significant and positive (β = 0.328, p < 0.05) which means hypothesis 8 is supported. The influence of User Satisfaction on Net Benefits is significant and positive (β = 0.542, p < 0.05), therefore hypothesis H9 is supported.

TABLE 4.8: STRUCTURAL EQUATION MODELLING STANDARDISED PATH COEFFICIENTS

Hypothesis	Relationship	Path Coefficients	p values	R-squared Adjusted
H1	SQ → SU	0.334	0.000	**NBs** R-squared Adjusted =0.715
H2	SQ → US	0.116	0.000	
H3	IQ → SU	0.227	0.000	
H4	IQ → US	0.182	0.000	**SU** R-squared Adjusted =0.759
H5	SVQ → SU	0.457	0.000	
H6	SVQ → US	0.201	0.000	
H7	SU → US	0.521	0.000	**US** R-squared Adjusted =0.842
H8	SU → NBs	0.328	0.000	
H9	US → NBs	0.542	0.000	

Note: SQ = System Quality, IQ = Information Quality, SVQ = Service Quality, SU = System Use, US = User Satisfaction, NBs = Net Benefits

Figure 4.1 illustrates the results of the structural model with coefficients. It also shows the R2 (determination coefficient) values of the variables of this study which indicate the amount of variance in the endogenous latent variable that is explained by its independent latent variables. Hair, Ringle and Sarstedt (2014) considered R2 values of 0.75, 0.50, and 0.25 for the dependent variables as substantial, moderate, and weak, respectively. However, Sanchez (2013) considered R2 values of > 0.60 as high, between 0.30 and 0.60 as moderate, and below 0.30 as low. The R2 for System Use is 0.77, which means

that 77% of the variance in System Use can be explained by System Quality, Information Quality, and Service Quality. The R2 for User Satisfaction is 0.849 which means that 84,9% of the variance in User Satisfaction is explained by System Quality, Information Quality, Service Quality, and System Use. The R2 for Net Benefits is 0.721, which means that 72.1% of the variance in Net Benefits can be explained by System Use, and User Satisfaction.
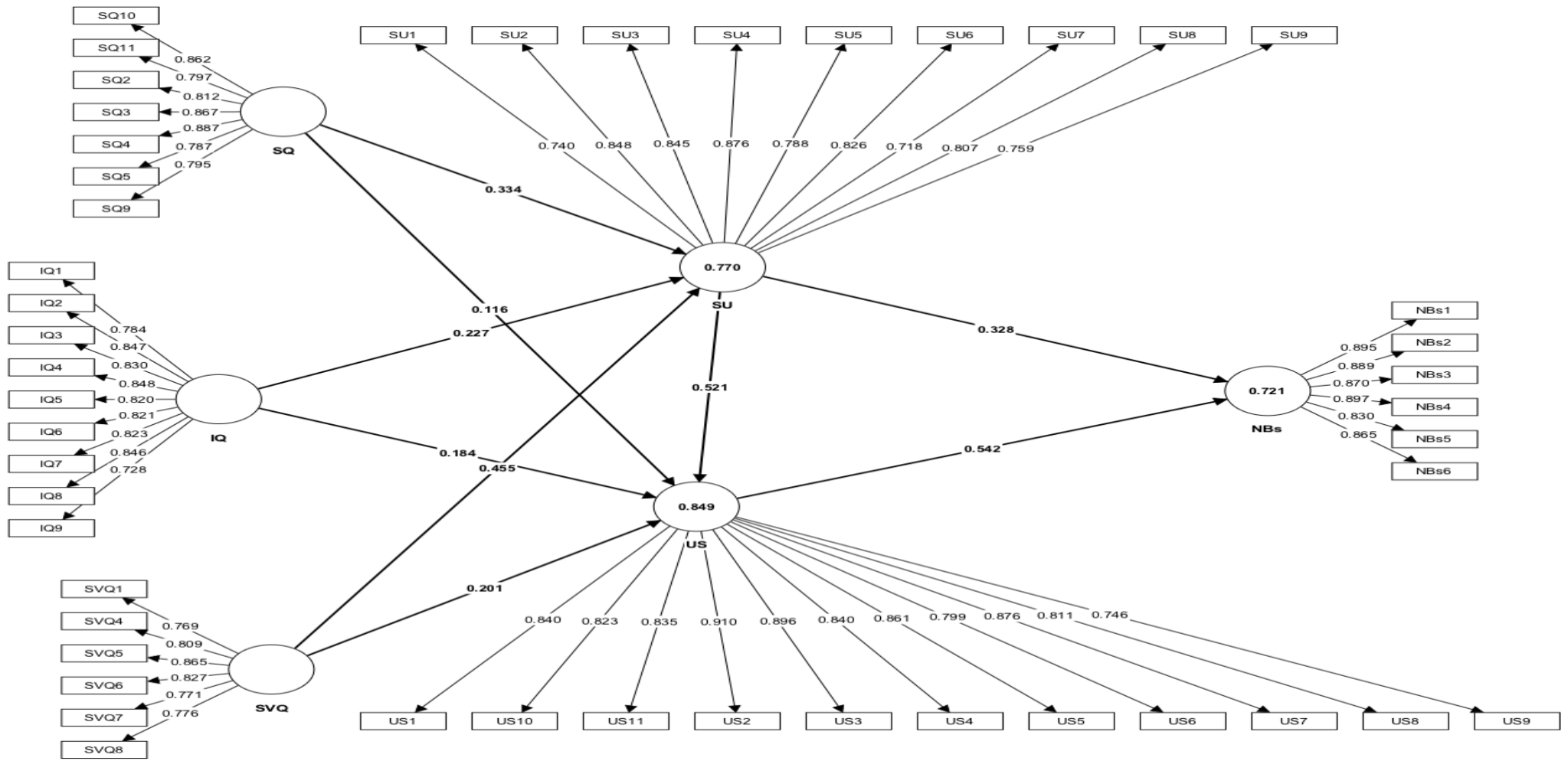
FIGURE 4.1:STRUCTURAL MODEL

Note: SQ = System Quality, IQ = Information Quality, SVQ = Service Quality, SU = System Use, US = User Satisfaction, NBs = Net Benefits

4.7 Summary of hypothesis

The summary of the hypotheses analysis presented in Table 4.9: indicates that the proposed relationship between System Quality and System Use is supported, as well as the relationship between System Quality and User Satisfaction. The proposed relationship between Information Quality and System Use is supported, so is the relationship between Information Quality and User Satisfaction. The proposed relationships between Service Quality and System Use, as well as between Service Quality and User Satisfaction are also supported. The relationship between System Use and User Satisfaction is also supported. Both the relationships between System Use and Net Benefits, and User Satisfaction and Net Benefits are also supported.

TABLE 4.9: SUMMARY OF HYPOTHESIS ANALYSIS (N = 161)

Hypothesis	Relationship	Results
H1	SQ →SU	Supported
H2	SQ → US	Supported
H3	IQ → SU	Supported
H4	IQ →US	Supported
H5	SVQ →SU	Supported
H6	SVQ → US	Supported
H7	SU →US	Supported
H8	SU →NBs	Supported
H9	US →NBs	Supported

Note: SQ = System Quality, IQ = Information Quality, SVQ = Service Quality, SU = System Use, US = User Satisfaction, NBs = Net Benefits

4.8 Summary of the chapter

In this chapter, the data collected were scientifically analysed and interpreted, and results presented. The results indicated that there was a significant positive relationship between System Quality and System Use, supporting H1. They also indicated a significant positive relationship between System Quality and User Satisfaction, hence also supporting H2. The relationships between Information Quality with both System Use and User Satisfaction were also shown to be significant and positive, supporting both H3 and H4. Significant positive relationships between Service Quality and System Use, as well as with User Satisfaction were revealed, supporting both H5 and H6.

The results also showed a significant positive relationship between System Use and User Satisfaction, supporting H7. Significant and positive relationships between both System Use and User Satisfaction with Net Benefits respectively were also confirmed in the study, hence both H8 and H9 were also supported.

The following chapter discusses the above results and draws conclusions for each hypothesis, as well as for the overall study.

Chapter 5. Discussion and Findings

5.1 Introduction

This chapter discusses the findings of the study, affirms the study's significance, states its limitations, suggests future related research, and lastly presents the overall study conclusions. It discusses the research hypotheses and compares the findings with the results of previous studies. The chapter then states the study's significance, based on its results. Limitations that the researcher came across whilst conducting the study are stated. The chapter then suggests related research that other researchers can conduct to build on the work produced by this study. The overall study conclusions explain how the findings of this study can assist mobile application stakeholders identify the factors that they need to give greater focus to, for their mobile application implementations to be successful.

5.2 Recapping the Purpose of the Study

The aim of this study was to evaluate the success of a mobile commerce application in streamlining customer self-services. To achieve the research aim, the following research hypotheses were tested:

H1: *System Quality (SQ) has a positive relationship with System Use (SU)*
(SQ → SU)

H2: *System Quality (SQ) has a positive relationship with User Satisfaction (US)*
(SQ → US)

H3: *Information Quality (IQ) has a positive relationship with System Use (SU)*
(IQ → SU)

H4: *Information Quality (IQ) has a positive relationship with User Satisfaction (US)*
(IQ → US)

H5: *Service Quality (SVQ) has a positive relationship with System Use (SU)*
(SVQ → SU)

H6: *Service Quality (SVQ) has a positive relationship with User Satisfaction (US)*
(SVQ → US)

H7: *System Use (SU) has a positive relationship with User Satisfaction (US)*
(SU → US)

H8: *System Use (SU) has a positive relationship with Net Benefits (NBs)*
(SU → NBs)

H9: *User Satisfaction (US) has a positive relationship with Net Benefits (NBs)*

   (US → NBs)

5.3 Discussion of Findings

This study found that the two behavioural variables (System Use and User Satisfaction) are dependent variables of the three quality variables (System Quality, Information Quality, Service Quality), and in turn the two are independent variables of Net Benefits. System Use was also found to be an independent variable to User Satisfaction. The effect of these findings on the hypotheses is discussed in the subsections below.

5.3.1 System Quality and System Use

H1: *System Quality (SQ) has a positive relationship with System Use (SU)*

   (SQ → SU)

The study found a significant and positive relationship between System Quality and System Use. This indicates support for H1. The results are in line with the research model proposed in this study. The results tell us that, if a mobile application has good System Quality, users will use the mobile application.

The findings are in line with various previous studies, such as those of Mkinga and Mandari (2020), whose findings revealed that System Quality had a positive and significant effect on System Use; Wang et al. (2019), who found that System Use was determined by System Quality; Martono et al. (2020), who found that System Quality had a significant influence on Intention to Use; Al-Adwan et al. (2021), who stated that System Quality had a direct positive influence on System Use; Sari, et al (2021), whose study found that System Quality had positive significance for System Use; and Alyoussef (2023), who found that System Use was positively and significantly influenced by System Quality.

The findings imply that mobile application providers need to focus on the System Quality aspects of their mobile application for their customers to use the mobile application. A good visual appearance, an attribute of System Quality, augurs well for the organisation's mobile application because "good visual presentation and interface design will attract consumers to make online purchases" (Yassierli et al., 2019, p. 152).

The hypothesised relationship between System Quality and System Use was therefore supported in this study.

5.3.2 System Quality and User Satisfaction

H2*: System Quality (SQ) has a positive relationship with User Satisfaction (US)*

(SQ → US)

The study found that there was a significant positive relationship between System Quality and User Satisfaction. Thus, H2 of this study was supported. The results are in line with the research model proposed in this study. The results tell us that, if a mobile application has a good System Quality, users will be satisfied with the mobile application.

The findings are in line with various previous studies, such as those of Dari & Prahartiwi (2020), Gurendrawati et al. (2022), Itthiphone et al. (2020), Isnaeningsih et al. (2021), Lee & Jeon (2020), Malada (2022), Nani and Lina (2022), Nugraheni and Bayastura (2021), and Salim et al (2021), whose findings indicated that System Quality had a positive effect on User Satisfaction; Martono et al. (2020), and Susanti and Mauritsius (2022), whose study showed that System Quality had significant influence on User Satisfaction; Yassierli et al. (2019), who found a positive and significant relationship between System Quality and User Satisfaction; Angelina et al. (2019), and Purwati et al. (2021), who found that System Quality had a significant effect on User Satisfaction; Al-Adwan et al. (2021), who stated that System Quality had a direct positive influence on User Satisfaction; Paramartha et al. (2021), whose study found that System Quality positively affected User Satisfaction; and Pratomo et al. (2021), who found that System Quality had positive influences on User Satisfaction.

The findings imply that mobile application providers need to focus on the System Quality aspects of their mobile application for their customers to be satisfied with the mobile application. The hypothesised relationship between System Quality and User Satisfaction was therefore supported in this study.

5.3.3 Information Quality and System Use

H3*: Information Quality (IQ) has a positive relationship with System Use (SU)*

(IQ → SU)

The study found that there was a significant positive relationship between Information Quality and System Use. Thus, H3 of this study was supported.

The results are in line with the research model proposed in this study. These results demonstrate that, if a mobile application has good Information Quality, users will use the mobile application.

These findings are also in line with various previous studies, such as those of Elsdaig and Nassar (2019), as well as Sorongan and Hidayati (2020), whose findings revealed that Information Quality had a positive effect on System Use; Al-Adwan et al. (2021), who stated that Information Quality had a direct positive influence on System Use; Sari, et al (2021), whose study found that Information Quality had positive significance for System Use; and Alyoussef (2023) who found that System Use was positively and significantly influenced by Information Quality.

The findings imply that mobile application providers need to also focus on the Information Quality aspects of their mobile application for their customers to use the mobile application. The hypothesised relationship between Information Quality and System Use was therefore supported in this study.

5.3.4 Information Quality and User Satisfaction

H4: *Information Quality (IQ) has a positive relationship with User Satisfaction (US)*

  (IQ → US)

The study found that there was a significant positive relationship between Information Quality and User Satisfaction. Thus, H4 of this study was supported. The results are in line with the research model proposed in this study. These results tell us that, if a mobile application has good Information Quality, users will be satisfied with the mobile application.

These findings are also in line with various previous studies, such as those of Kurt et al. (2022), Lee and Jeon (2020), Mkinga and Mandari (2020), Purwati et al. (2021), Sorongan and Hidayati (2020), Usadi et al. (2022), and Vigim (2019) whose results showed that Information Quality had positive effects on User Satisfaction; Malada (2022), whose findings showed that Information Quality had a positive and significant effect on User Satisfaction; Wang et al. (2019), who stated that User Satisfaction was determined by

Information Quality; Anggraeni and Sanjaya (2021), and Yassierli et al. (2019), who found a positive and significant relationship between Information Quality and User Satisfaction; Al-Fraihat et al. (2020), who found that User Satisfaction was determined by Information Quality; Paramartha et al. (2021), whose study results indicated that Information Quality positively affected User Satisfaction; Al-Adwan et al. (2021), who stated that Information Quality had a direct positive influence on User Satisfaction; Itthiphone et al. (2020), who found that Information Quality had significant effect on User Satisfaction; Yoo (2020), whose study found that Information Quality positively influenced User Satisfaction; Pratomo et al. (2021), who found that Information Quality had positive influence on User Satisfaction; Salim et al. (2021), who stated that Information Quality had a positive impact on User Satisfaction; and Sari, et al (2021), whose study found that Information Quality had positive significance for User Satisfaction.

The findings imply that mobile application providers need to also focus on the Information Quality aspects of their mobile application for their customers to be satisfied with the mobile application. The hypothesised relationship between Information Quality and User Satisfaction was therefore supported in this study.

5.3.5 Service Quality and System Use

H5: Service Quality (SVQ) has a positive relationship with System Use (SU)

   (SVQ → SU)

The study found a significant and positive relationship between Service Quality and System Use. This indicates support for H5. The results are in line with the research model proposed in this study. The results tell us that, if a mobile application's quality of service is good, users will use the mobile application.

The findings are also in line with studies such as those of Elsdaig and Nassar (2019), who found that Service Quality had a positive effect on System Use; Mkinga and Mandari (2020), who found that Service Quality influenced System Use; Al-Adwan et al. (2021), who found that Service Quality had a direct positive influence on System Use; and Sari, et al (2021), whose results indicated that Service Quality had positive significance for System Use.

The findings imply that mobile application providers need to also focus on the Service Quality aspects of their mobile applications because that results in the mobile applications being used by customers.

It can therefore be argued that, if a mobile application has good Service Quality, customers will use it. The hypothesised relationship between Service Quality and System Use was therefore supported in this study.

5.3.6 Service Quality and User Satisfaction

H6: Service Quality (SVQ) has a positive relationship with User Satisfaction (US)

(SVQ → US)

The study found that there was a significant and positive relationship between Service Quality and User Satisfaction. This indicates support for H6. The results are in line with the research model proposed in this study. The results tell us that, if a mobile application has good Service Quality, users will find the application satisfying in meeting their needs.

The findings are also in line with studies such as those of Usadi et al. (2022), and Gurendrawati et al. (2022), who found that Service Quality had a significant positive effect on User Satisfaction; Itthiphone et al. (2020), and Lee and Jeon (2020), who found that Service Quality had a positive effect on User Satisfaction; and Salim et al. (2021), who stated that Service Quality positively affected User Satisfaction.

The findings imply that mobile application providers need to also focus on the Service Quality capabilities of their mobile applications, for their customers to be satisfied with the mobile applications. It can therefore be argued that the more a mobile application provides good quality of service, the more users will be satisfied with the mobile application. Therefore, the hypothesised relationship between Service Quality and User Satisfaction was supported by in study.

5.3.7 System Use and User Satisfaction

H7: System Use (SU) has a positive relationship with User Satisfaction (US)

(SU → US)

The study found that there was a significant and positive relationship between System Use and User Satisfaction. This indicates support for H7. The results are in line with the research model proposed in this study.

The results tell us that, if a mobile application has good System Use attributes, users will be satisfied with the mobile application after using it.

The findings are also in line with studies such as those of Elsdaig and Nassar (2019), who found that System Use had a positive effect on User Satisfaction; Mawart and Seprina (2022), who found that user satisfaction with the system was influenced by the level of the use of the system itself; and Singh, Sinha, and Liébana-Cabanillas (2020), who found that users' intention to use a system influenced users' perceived satisfaction with the system. Al-Fraihat et al. (2020) stated that customers will revisit a mobile application if they were satisfied with the application when they first used it.

The findings imply that mobile application providers need to also focus on the System Use capabilities of their mobile application, for their customers to be satisfied with the mobile application. It can therefore be argued that the more a mobile application has good System Use attributes, the more users will be satisfied with the mobile application. Therefore, the hypothesised relationship between System Use and User Satisfaction was supported in this study.

5.3.8 System Use and Net Benefits

H8: System Use (SU) has a positive relationship with Net Benefits (NBs)

   (SU → NBs)

The study found that there was a significant and positive relationship between System Use and Net Benefits. This indicates support for H8. The results are in line with the research model proposed in this study. The results tell us that, if a mobile application has good System Use, users will benefit from using it.

The findings are also in line with studies such as those of Elsdaig and Nassar (2019), and Alyoussef (2023), who found that System Use had a positive effect on Net Benefits; Sari, et al (2021), who found that System Use had a positive significance on Net Benefits; and Al-Fraihat et al. (2020), whose results indicated that Net Benefit was explained by System Use.

The findings imply that mobile application providers need to also focus on the System Use capabilities of their mobile application, for their customers to benefit from using the mobile applications. It can therefore be argued that the more a mobile application provides good System Use, the more users will benefit from using the mobile application. Therefore, the hypothesised relationship between System Use and Net Benefits was supported in this study.

5.3.9 User Satisfaction and Net Benefits

H9: User Satisfaction (US) has a positive relationship with Net Benefits (NBs)

(US → NBs)

The study found a positive and significant relationship between User Satisfaction and Net Benefits. This indicates support for H9. The results are in line with the research model proposed in this study. The results tell us that, when customers are satisfied with a mobile application, they realise benefits from using it.

The results are in line with Elsdaig and Nassar (2019) who found that User Satisfaction had a positive effect on Net Benefits; Amalina and Suryani (2020), Dari and Prahartiwi (2020), and Purwati et al. (2021), all concurred as they also found that User Satisfaction had a positive effect on Net Benefits; Al-Fraihat et al. (2020), who stated that Net Benefits was explained by Perceived Satisfaction; and Shabila & Djamaludin (2022), whose results indicated that Consumer Satisfaction had a positive and significant effect on Net Benefits. Alshibly (2020) suggested that an increase in User Satisfaction leads to an increase in the Net Benefits that an organisation and users get from using a system. According to Pratomo et al. (2021), users of the system they measured were satisfied and continued to use the system because they benefitted from using it.

The findings imply that mobile application providers need to focus on factors that will lead to user satisfaction with the mobile application because that will result in the users realising benefits from using the app. It can therefore be argued that the more mobile application users are satisfied with a mobile application, the more they benefit from using the mobile application. The hypothesised relationship between User Satisfaction and Net Benefits was therefore supported in this study.

5.4 Significance of the Study

This study has both theoretical and practical significance in the Information Systems subdomain of mobile commerce applications development.

Theoretically, the study contributes to the body of knowledge related to the evaluation of the success of mobile applications, and the continued validation of the DeLone and McLean IS success model.

The study adopted this model in the context of mobile applications, resulting in the development of the conceptual framework proposed in this study. The conceptual framework is the main theoretical contribution of this study and forms basis for future research on the evaluation of the success of mobile commerce applications.

Practically, the study provides various mobile commerce application stakeholders with empirically and scientifically verified factors to use when evaluating the success of their mobile applications. This will help in minimising the potential failure of their mobile application development initiatives, particularly in the telecommunications industry. The heads of IT departments in the corporate world can draw upon the results of this study to inform their investment decisions on new and existing mobile application implementation projects. Mobile application designers and architects can focus their mobile solution design efforts on features that are in line with the factors that are most important to mobile application users, based on the results of this study. Mobile application developers can spend their programming time and efforts on the mobile application features that will make their applications beneficial to their users. Project managers and product owners can use the findings of this study when managing mobile application development projects in order to choose which features are necessary to prioritise and implement for the benefit of customers. Support staff can come up with ways to improve the service quality they provide to their company's mobile application users based on the informed knowledge emanating from the findings of this study.

5.5 Limitations and Recommendations

The study was conducted on one mobile commerce application that belongs to one company, therefore the findings may not be applicable to the mobile applications of other companies. Future research may be focused on collecting data from multiple companies to test the conceptual model developed in this study.

The researcher collected data during Covid 19, and could not meet the respondents physically nor share hard copies of the questionnaire, which meant that potential respondents that may have preferred to respond to the questionnaire manually may have withdrawn. The researcher was only permitted to collect data from 300 users of the mobile application by the company.

This limitation resulted in a small sample size, although sufficient given the total target population.

5.6 Future Research

Since the study was conducted on a mobile application of an individual telecommunications company in South Africa, it would be interesting to assess results generated by a similar study of other telecommunications companies both in South Africa and other developing countries. A comparative study of mobile applications belonging to two or more telecommunications companies, where results are compared to each other would deepen our understanding of the various factors that influence the mobile applications of telecommunication companies.

The study was conducted from a mobile application users' perspective, therefore a similar study derived from an organisational perspective could be carried out with the objective of advising investment decisions of mobile application development companies. Another similar study can also be conducted within other industries to determine whether or not the same factors have the same influence on each other, and whether or not similar results are yielded.

5.7 Conclusion

This study aimed to evaluate the success of a mobile commerce application in streamlining customer self-services. A mobile application of a telecommunications company in South Africa was used as a case to investigate. The DeLone and McLean IS success model (DeLone & McLean, 2003) was adopted to guide the study and develop the data collection instrument. An anonymous self-administered questionnaire based on the attributes of the six dimensions of the model (i.e., System Quality, Information Quality, Service Quality, System Use, User Satisfaction, and Net Benefits) was electronically sent to respondents.

PL-SEM was used to analyse the data and test the hypothesised relationships amongst the factors of the study conceptual model. The results showed a positive and significant relationship between System Quality and System Use, as well as between System Quality and User Satisfaction. The study also found a positive and significant relationship between Information Quality and System Use, as well as between Information Quality and User Satisfaction. The study also found a positive and significant relationship between Service Quality and System Use, as well as between Service Quality and User Satisfaction. The study also found a positive and significant relationship between System Use and User Satisfaction, as well as between System Use and Net Benefits. Finally, this study found a positive and significant relationship between User Satisfaction and Net Benefits.

Based on the results of this study, it is recommended that mobile application stakeholders should ensure that their mobile applications have good system, information, and service qualities. These will encourage their customers to use their company's mobile applications, leading to the customers being satisfied and benefitting from using the mobile apps. The continued use of the mobile applications will result in the mobile applications implementation being a success.

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APPENDICES

Appendix A. Research Permission Request

Request for permission to conduct research at ▮▮▮▮ **SA SOC Limited**

Title: *Evaluating the success of a mobile commerce application in streamlining customer self-services*

25 April 2021

To:

Ms Beauty Apleni

▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

▮▮▮▮ Consumer Engagement

AplenBN1@▮▮▮▮▮▮▮▮

Dear Ms Apleni,

I, **Yongama Kendle** am doing research with **Dr Baldreck Chipangura (PhD)**, a Senior Lecturer in the Department of Information Systems towards an M.Tech: Information Technology at the University of South Africa. We hereby request permission to conduct the study entitled, *Evaluating the success of a mobile commerce application in streamlining customer self-services*, in your Business Unit within ▮▮▮▮ SA SOC Limited.

The aim of the study is to investigate whether mobile applications used by customers to access company products and services provide value to the customers. This will be done through the use of an academic theory called the DeLone and McLean Information Systems Success Model. This theory proposes six dimensions (i.e. system quality, service quality, information quality, system use, user satisfaction, and net benefits) be used to evaluate effectiveness and success of any Information System. This study therefore will apply this theory in the mobile applications context, particular those of telecommunications companies in South Africa.

Your company was selected because it is one of the largest telecommunications providers in South Africa, with its own mobile applications in the market.

The study will entail a self-administered online questionnaire to be sent via email to your company's mobile application users, asking for their views on the success of your organizations's mobile application. The questionnaire will be based on attributes of the six dimensions of the DeLone and McLean Information Systems Success Model as mentioned above.

The benefits of this study will be to gain deeper knowledge and understanding on the factors that mobile applications developers need to focus on for their applications to be effective and successful.

Potential risks are very minimal to all participants as well as the organization. All participants' information will be kept confidential. Effort will be made to also conceal the identity of the organization in the study.

Feedback procedure will entail a summarised report of the outcomes of the study, which can be shared with yourself as well as anyone you may deem relevant in the organization, should that be necessary.

Yours sincerely

Yongama Kendle

Masters Research Student

University of South Africa

Appendix B. Research Permission Approval

CONSUMER ENGAGEMENT

Memorandum

Tel	:	████████
Fax	:	██
Email	:	████████

To	:	Yongama Kendle
From	:	Beauty Apleni
C.C.	:	Dr Baldreck Chipangura
Date	:	26 April 2021
Subject	:	████████████████████

Dear Mr. Kendle

Your letter received on 25 April 2021 refers.

Permission is hereby granted to you to conduct the research titled "*Evaluating the success of a mobile commerce application in streamlining customer self-services*", on our company's mobile application.

Any information gathered during the research should be kept confidential and strictly be used for the purposes of your study. No mobile application user's information should be made available to any third parties. Care should be taken to not reveal the identity of ████ and any of the users participating in your study.

Please contact Mr. L Balfour in my office for the list of our mobile application users who may be willing to participate in your study, and for any assistance you may require in this regard.

All the best with your studies.

Kind Regards,

Beauty Apleni
Managing Executive: Customer Engagement

Appendix C. Anonymous web-based survey cover letter

ERC Reference #: 2021/CSET/SOC/030

COVER LETTER TO AN ONLINE ANONYMOUS WEB-BASED SURVEY

Dear Prospective participant,

You are invited to participate in a survey conducted by **Yongama Kendle** under the supervision of **Dr Baldreck Chipangura (PhD)**, a **Senior Lecturer** in the **Department of Information Systems** towards an **M.Tech: Information Technology** at the University of South Africa.

The survey you have received has been designed for study entitled "**Evaluating the success of a mobile commerce application in streamlining customer self-services**". You were selected to participate in this survey because you work for the business unit of the organization at which the study is being conducted. You will not be eligible to complete the survey if you are younger than 18 years. By completing this survey, you agree that the information you provide may be used for research purposes, including dissemination through peer-reviewed publications and conference proceedings.

It is anticipated that the information we gain from this survey will help us to gain deeper knowledge and understanding on the attributes that mobile application developers need to focus on when developing mobile applications, in order for these applications to provide value to customers. You are, however, under no obligation to complete the survey and you can withdraw from the study prior to submitting the survey. The survey is developed to be anonymous, meaning that we will have no way of connecting the information that you provide to you personally. Consequently, you will not be able to withdraw from the study once you have clicked the send button based on the anonymous nature of the survey. If you choose to participate in this survey it will take up no more than 30 minutes of your time. You will not benefit from your participation as an individual, however, it is envisioned that the findings of this study will help in understanding the value mobile applications provide to customers. We do not foresee that you will experience any negative consequences by completing the survey. The researcher(s) undertake to keep any information provided herein confidential, not to let it out of our possession and to report on the

findings from the perspective of the participating group and not from the perspective of an individual.

The records will be kept for five years for audit purposes where after it will be permanently destroyed and electronic versions will be permanently deleted from the hard drive of the computer. You will not be reimbursed or receive any incentives for your participation in the survey.

The research was reviewed and approved by the UNISA School of Computing Ethics Review Committee. The primary researcher, **Mr Yongama Kendle**, can be contacted on +27 73 155 3984 or email: yongamak@gmail.com. The study leader, **Dr Baldreck Chipangura**, can be contacted during office hours at +27 11 670 9106 or email: chipab@unisa.ac.za.

Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the UNISA School of Computing Ethics Review Committee, **Dr. Danie Bischoff** via email: dbischof@unisa.ac.za. Alternatively, you can report any serious unethical behaviour on the University's Toll Free Hotline 0800 86 96 93.

You are making a decision whether or not to participate by continuing to the next page. You are free to withdraw from the study at any time prior to clicking the send button.

Appendix D. Data Collection Instrument

Section A: Demographic Information

DI1: Gender

Gender	Please select (X)
Female	1
Male	2

DI2: Age Group

Age Group	Please select (X)
Under 18	1
18 - 24	2
25 – 34	3
35 – 44	4
45 – 54	5
55 – 64	6
65+	7

DI3: Level of education

Highest Qualification	Please select (X)
Matric	1
Post Matric Certificate	2
Post Matric Diploma	3
Bachelor's Degree / B-Tech	4
Postgraduate Degree	5

DI4: How often do you use the mobile application of the organization?

Frequency	Please select (X)
Daily	1
A few times per week	2
Weekly	3
2 - 3 times per month	4
Monthly	5
Not consistently	6

Section B: System Quality

With reference to the organization's mobile app, please indicate the extent to which you agree with

the following statements, using a scale of 1 - 5

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

The mobile app…		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
SQ1.	has necessary features and functions	1	2	3	4	5
SQ2.	is functional	1	2	3	4	5
SQ3.	is usable	1	2	3	4	5
SQ4.	is easy to use	1	2	3	4	5
SQ5.	is easy to learn	1	2	3	4	5
SQ6.	is available whenever I want to use it	1	2	3	4	5
SQ7.	is reliable - it is error / bug free and does not crash in the middle of transactions	1	2	3	4	5
SQ8.	has a good response time	1	2	3	4	5
SQ9.	has an appealing visual appearance	1	2	3	4	5
SQ10.	has a simple interface design that makes it easy to navigate within the app	1	2	3	4	5
SQ11.	makes it is easy to access information needed on it (not too many clicks)	1	2	3	4	5

Section C: Information Quality

With reference to the organization's mobile app, please indicate the extent to which you agree with

the following statements, using a scale of 1 - 5

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

In terms of the products (e.g., cell phones) and services (e.g., airtime or data) offered, the mobile app gives…		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
IQ1.	useful information	1	2	3	4	5
IQ2.	relevant information	1	2	3	4	5
IQ3.	accurate information	1	2	3	4	5
IQ4.	up to date information	1	2	3	4	5
IQ5.	timely information	1	2	3	4	5
IQ6.	complete information	1	2	3	4	5
IQ7.	concise information	1	2	3	4	5
IQ8.	understandable information	1	2	3	4	5
IQ9.	well formatted information	1	2	3	4	5
IQ10.	personalised information	1	2	3	4	5

Section D: Service Quality

With reference to the organization's mobile app, please indicate the extent to which you agree with

the following statements, using a scale of 1 - 5

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

The mobile app…		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
SVQ1.	has teach yourself help tutorials	1	2	3	4	5
SVQ2.	allows me to buy products and services online	1	2	3	4	5
SVQ3.	allows me to make payments for my products and services	1	2	3	4	5
SVQ4.	allows me to request my products to be delivered to my address	1	2	3	4	5
SVQ5.	allows me to track the status of my orders	1	2	3	4	5
SVQ6.	allows me to report and track issues	1	2	3	4	5
SVQ7.	allows me to chat with a service support agent to resolve my reported issues	1	2	3	4	5
SVQ8.	provides frequently asked questions, which help me quickly find resolutions to my issues	1	2	3	4	5

Section E: System Use

With reference to the organization's mobile app, please indicate the extent to which you agree with

the following statements, using a scale of 1 - 5

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

The mobile app…		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
SU1.	is easy to navigate around	1	2	3	4	5
SU2.	is easy to use to complete transactions	1	2	3	4	5
SU3.	is easy to use to search and find products and services	1	2	3	4	5
SU4.	is easy to use to order of products and services	1	2	3	4	5
SU5.	is easy to use to make payments for products and services ordered	1	2	3	4	5
SU6.	is easy to use to track the status of orders	1	2	3	4	5
SU7.	is easy to use to report issues	1	2	3	4	5
SU8.	is easy to use when performing different transactions	1	2	3	4	5
SU9.	I intend to re-use the mobile app in future	1	2	3	4	5

Section F: User Satisfaction

With reference to the organization's mobile app, please indicate the extent to which you agree with

the following statements, using a scale of 1 - 5

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

I am satisfied...		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
US1.	with the features of the mobile app	1	2	3	4	5
US2.	that the mobile app meets my online transaction needs	1	2	3	4	5
US3.	that the mobile app meets my online transaction expectations	1	2	3	4	5
US4.	that the mobile app has improved my access to products and services offered	1	2	3	4	5
US5.	with the retrieval of products and services in the mobile app	1	2	3	4	5
US6.	with the payment options provided in the mobile app	1	2	3	4	5
US7.	with the receipt of goods and services purchased using the mobile app	1	2	3	4	5
US8.	with the self-help support rendered in the mobile app	1	2	3	4	5
US9.	with the support provided by the mobile app service provider when dealing my reported issues	1	2	3	4	5
US10.	with the way in which my information is presented in the mobile app	1	2	3	4	5

I am satisfied...	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
US11. with the general performance of the mobile app	1	2	3	4	5

Section G: Net Benefits

With reference to the organization's mobile app, please indicate the extent to which you agree with

the following statements, using a scale of 1 - 5

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

The mobile app…	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
NBs1. reduces my time to search for products and services as I can easily locate them on the app	1	2	3	4	5
NBs2. reduces my costs of shopping for products and services as I do not need to physically go to the mobile app service provider store	1	2	3	4	5
NBs3. enables me to make more informed purchase decisions on products and services offered	1	2	3	4	5
NBs4. timeously markets products and services relevant to my shopping needs	1	2	3	4	5
NBs5. gives me access to advertised products and services	1	2	3	4	5
NBs6. improves my customer experience	1	2	3	4	5

Appendix E. Ethical Clearance Certificate

UNISA | university of south africa

UNISA COLLEGE OF SCIENCE, ENGINEERING AND TECHNOLOGY ETHICS REVIEW COMMITTEE

2021-09-14

Dear Mr Y Kendle

> **Decision: Ethics Approval from 2021/09/14 for three years**

ERC Reference # :2021/CSET/SOC/030

Name : Mr Y Kendle

Student #: 41280636

Staff #:

Researcher(s): Name Mr Y Kendle
41280636@mylife.unisa.ac.za; 0731553984
Dr B Chipangura
chipab@unisa.ac.za; 011 670 9016

> **Working title of research: Evaluating the value added by mobile applications to simplify access, self-provision and assurance by customers**

Qualification: MTech (Information Technology)

Thank you for the application for research ethics clearance by the Unisa College of Science Engineering and Technology Ethics Review Committee for the above-mentioned research. Ethics approval is **provisionally granted on condition that you submit the final version of your questionnaire to the ethics committee as an amendment prior to collection of data.** Approval is for 3 years.

The **low risk application** was **reviewed** by the College of Science, Engineering and Technology (CSET) Ethics Review Committee on 2021-09-14 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment. The decision will be tabled at the next Committee meeting for ratification.
The proposed research may now commence with the provisions that:

1. **The researcher provides the ethics committee with the final version of the questionnaire to be used as an amendment prior to commencement of data collection.**
2. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
3. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the SOC Ethics Committee.
4. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.

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5. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.

6. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.

7. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.

8. No field work activities may continue after the expiry date (2024-09-14). Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

9. Permission is granted only for the literature survey part of the study. Should any further work involve research involving humans or secondary data these aspects need to be subject to further ethical clearance applications.

Note:
The reference number 2021/CSET/SOC/30 should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Yours sincerely,

HH Lotriet

_____

Prof HH Lotriet
Chair of the Department of Information Systems Ethics Review Subcommittee
College of Science, Engineering and Technology (CSET)
e-mail : lotrihh@unisa.ac.za
Tel : 011 471 2661

_____

Prof E Mnkandla
Director : School of Computing
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_____

Prof BB Mamba
Executive Dean
College of Science Engineering and
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E-mail : mambabb@unisa.ac.za
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URERC 25.04.17 - Decision template (V2) - Approve

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Appendix F. Turn-It-In Results

Y.Kendle - 41280636 - DFCOM92 - Dissertation - Msc
Computing - December 2023

Appendix G. First Editor Certificate

EDITING
Formatting
EXCEL

ANNE DENNISTON

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DECLARATION OF EDITING

MSc Computing (Unisa) for Yongama Kendle

Evaluating the success of a mobile commerce application in streamlining customer self-services

I, Margaret Anne Denniston (Identity Number 540307 0082 08 7), hereby confirm that I formatted and edited the above-named dissertation ethically and to the best of my ability. The author had the ability and choice to accept or reject my suggestions and changes. Detecting plagiarism was not part of my scope and it was the author's responsibility to avoid plagiarism. However, as far as I can ascertain, the work is substantially ready for submission. I am not responsible for changes made after I delivered the document on 27 May 2023.

My academic and professional qualifications are as follows:

1. BA (Wits), H.Dip.Lib. (Wits)
2. Accreditation for Text Editing in English by the Professional Editors' Guild, Member Number DEN002.

Signature

27 May 2023

Date

Appendix H. Second Editor Certificate

Ms. Tsitsi S.A. SACHIKONYE
Language Consultant
consultant.sachikonye@gmail.com

DECLARATION OF EDITING

I, Ms. Tsitsi S.A. SACHIKONYE, hereby declare that I edited the MSc dissertation entitled "**Evaluating the success of a mobile commerce application in streamlining customer self-services**" written by Mr Yongama KENDLE. I did so ethically and to the best of my ability.

My version of the edited document was returned to him on 2 December 2023 and that was the final time I handled the document. He was advised to review the editing and he had the choice to accept or reject my suggestions and changes. Detecting plagiarism was not part of my scope and it was the author's responsibility to avoid plagiarism.

I commend Mr Yongama KENDLE for his contribution to academia and I wish him the best as he now submits his work to the university in fulfilment with the requirements of his degree.

Sincerely,

Ms. Tsitsi S.A. SACHIKONYE
5 December 2023

Regarding my qualifications:
I am a Language Consultant with a Bachelor of Social Science degree in Organizational Psychology, Industrial Sociology and French (Rhodes University), an Honours degree in French (Rhodes University), a Masters of Social Science degree in French (Rhodes University) and a Masters of Arts degree in Creative Writing (Rhodes University).