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Evaluating the success of a mobile self-service application using the DeLone and McLean model

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Background: This study was initiated by the fact that numerous mobile(m)-commerce applications for streamlining customer self-services remain unused on Application (App) stores or that they are briefly used and abandoned by the users. Unused applications can be considered as failed by customers; therefore, there is a need to understand how customers perceive m-commerce applications as successful.

Objectives: To investigate the factors that inform how customers perceive m-commerce applications for streamlining self-services as successful.

Method: Data were collected from customers of an m-commerce application for a telecommunication company in South Africa. An online survey constructed from the DeLone and McLean Information Systems Success model was used to collect data from a randomly selected sample of customers extracted from the telecommunication database. A total of 161 usable responses were received and quantitatively analysed. In total, nine hypotheses were tested to evaluate the success of the m-commerce application using the partial least-squares structural equation modelling (PLS-SEM) analysis.

Results: The nine hypotheses were significant, indicating that the telecommunication m-commerce application can be viewed as successful. The results confirmed that system quality (SQ), information quality (IQ), service quality (SVQ), system use (SU), and user satisfaction (US) were factors that inform the successful deployment of an m-commerce application in this study.

Conclusion: Successful m-commerce applications are essential to improve customer acceptance and use of m-commerce applications.

Contribution: The study identified factors that are perceived as valuable by the customer, which service providers should implement to provide successful m-commerce applications.

Keywords: mobile applications; success; m-commerce; DeLone and McLean model; self-service.

Introduction

Mobile(m)-commerce applications are a subset of electronic(e)-commerce applications (Nani & Lina 2022). Nani and Lina (2022) are of the view that mobile applications enable e-commerce to take advantage of mobility and allow users to make transactions from any place at any time. Additionally, m-commerce attracts new customers, particularly those who are primarily mobile-centric users (Chipangura 2016). Distinct advantages of m-commerce have attracted investments in m-commerce application design and deployment; however, the return on investment is uncertain (Lakhani 2020; Legner, Nolte & Urbach 2011). Lakhani (2020) estimated that 1% of mobile applications succeed, with some applications on Application (App) stores not downloaded at all, and others deleted after being used a few times. Legner et al. (2011) concluded that the low success of mobile applications in the App stores indicates a business loss.

From the perspectives of Whyte and Bytheway (1996), there are contradictions of views between users and service providers of what can be regarded as a successful information system. A service provider may perceive an information system as successful if it uses the latest technologies, for example, mobile applications or cloud computing. On the other hand, even if a service provider regards an information system as a success, customers will not use the system if it is not aligned with their needs, which makes it a failure. Hence, one way to understand the success of m-commerce applications is through customer perspectives.

One way for measuring how users perceive if an information system is successful is to employ the DeLone and McLean Information Systems (IS) Success model (DeLone & McLean 2003). The key elements of the model are system quality (SQ), information quality (IQ), service quality (SVQ), user satisfaction (US), and system use (SU). In this study, the model was adopted and applied to investigate the factors that inform how customers perceive m-commerce applications for streamlining self-services as successful. Data were collected from customers who use an m-commerce application for a telecommunication company in South Africa.

The telecommunication company's m-commerce application provides customers with services such as account payment, broadband credit enhancements, order tracking, fault log, and help with troubleshooting issues experienced with company products and services. The results of the evaluation of the m-commerce application are important to identify the factors that m-commerce service providers need to implement to produce successful applications that users will adopt and use.

Literature analysis: Success of m-commerce applications

Recently, there has been an increase in the number of companies adopting m-commerce applications. Justino, Tengeh and Twum-Darko (2021) argued that the increase in the adoption of m-commerce applications by businesses is to maximise profits by improving service delivery and market share. Simultaneously, there has been a significant increase in empirical research evaluating the success of m-commerce applications (Kurt, Aktaş & Turan 2022; Nani & Lina 2022; Rahman & Ekaputri 2021; Yoo 2020).

DeLone and McLean (2003) described the success of technology in terms of the effectiveness, value, and efficiency of a technology in accomplishing its intended purpose by customers. The success of an information system is of concern to many stakeholders (users, managers, and shareholders) in the business chain because they want to understand the return on investment (Purwati, Mustafa & Deli 2021; Sari, Hidayatullah & Prasetya 2021). However, Mawarti and Seprina (2022) argued that not all the benefits of an information system can be monetarised; hence, technology success cannot be measured exclusively using financial methods. This is in line with Eybers (2015), who argued that information systems are valuable to business, even though their value cannot only be measured using traditional financial measures such as return on investment.

To overcome the challenges of measuring the success of information system applications, DeLone and McLean (2003) proposed the DeLone and McLean IS success model. The model postulates that the success and effectiveness of an information system are seen through the net benefits (NB) that an organisation gets from using an information system. According to the authors, the success of an information system can be evaluated through six interrelated constructs, which are divided into three logical levels. The first level has three constructs that constitute the quality dimension (SQ, IQ, and SVQ). The quality dimension constructs affect the second-tier constructs (SU & US) which, in turn, affect the third-tier constructs, the NB. The DeLone and McLean model does not measure the success of an information system using monetary metrics. This study adopted the DeLone and McLean model (2003), and the following sections discuss the constructs of the model and propose hypotheses for this study.

System quality

System quality refers to the desired characteristics of an information system (DeLone & McLean 2003). An information system that is of acceptable quality to users is presumed to be usable, available, reliable, adaptable, and responsive (Petter, DeLone & McLean 2008; Yoo 2020; Nani & Lina 2022). The SQ characteristics of an information system determine whether users will use the system and if users will be satisfied when using the system. The SQ construct has been validated by studies investigating the success of m-commerce applications (Yoo 2020; Rahman & Ekaputri 2021; Kurt et al. 2022; Nani & Lina 2022). There are studies that found a significant relationship between SQ and SU, and between SQ and US (Nani &Lina 2022; Elsdaig & Nassar 2019). In contrast, there are also studies on m-commerce that found insignificant relationship between SQ and SU, and between SQ and US (Kurt et al. 2022; Yoo 2020). Based on the reviewed literature, this study hypothesised that:

H1: System quality has a positive relationship with system use.

H2: System quality has a positive relationship with user satisfaction.

Information quality

Information quality is concerned with the ability of the system to store, process, and provide information that enables customers to acquire knowledge and make decisions (Alshikhi & Abdullah 2018; Rieh 2002). Many scholars agree that the attributes of IQ include, but are not limited to, relevance, understandability, accuracy, conciseness, completeness, currency, timeliness, and usability (Alshikhi & Abdullah 2018; DeLone & McLean 2003; Petter at al. 2008; Rieh 2002). According to the DeLone and McLean IS success model, IQ determines SU and US (DeLone & McLean 2003), which implies that if an information system has good IQ, customers will be satisfied when using it. Research on m-commerce that empirically tested the DeLone & McLean IS success model got varying results regarding the relationships between IQ and SU, and between IQ and US. Elsdaig and Nassar (2019) found a significant positive relationship between IQ and SU, while Angelina, Hermawan and Suroso (2019) found an insignificant effect between IQ and SU. Based on the findings of the reviewed literature, this study hypothesised that:

H3: Information quality has a positive relationship with system use.

H4: Information quality has a positive relationship with user satisfaction.

Service quality

Service quality is how users perceive the quality of support that they receive from a service provider of an information system (DeLone & McLean 2003). Because an information system provides services to customers, it is fundamental that the customers are supported when using the information system (Petter et al. 2008). In the perspective of Prajapati (2020), providing good customer care improves the performance of an information system, enabling customers to perform their tasks. Satisfied customers remain loyal and recommend other customers. Attributes that measure SVQ are central to assurance, empathy, online support, responsiveness, and technical competence of the service provider (DeLone & McLean 2003, 2004; Nani & Lina 2022).

According to DeLone and McLean (2003), SVQ influences both SU and US, which means good SVQ satisfies customers. Empirical studies that validated the SVQ construct found contrasting results. Mkinga and Mandari (2020) found that SVQ had a significant relationship with SU and US. In contrast, a study by Amalina and Suryani (2020) found that SVQ had an insignificant relationship with US. Based on the reviewed literature, this study hypothesised that:

> **H5:** Service quality has a positive relationship with system use.
>
> **H6:** Service quality has a positive relationship with user satisfaction.

System use

The success of a system is measured by the extent to which it is used (DeLone & McLean 2003). System use is the actual usage of an information system by the target users for the intended purpose (Rahman & Ekaputri 2021). Attributes of SU include the frequency of use, the appropriateness of use, the extent 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 (Mawarti & Seprina 2022; Pratomo et al. 2021). When evaluating an m-commerce application, Elsdaig and Nassar (2019) found a significant relationship between SU and both US and NB. In contrast, Amalina and Suryani (2020) found an insignificant relationship between SU and both US and NB. Based on the reviewed literature, this study hypothesised that:

> **H7:** System use has a positive relationship with user satisfaction.
>
> **H8:** System use has a positive relationship with net benefits.

User satisfaction

User satisfaction determines how users are content with an information system (DeLone & McLean 2003). Shabila and Djamaludin (2022) related US to the perception that users have of the benefits gained from using an information system. Satisfaction from using a system is judged after a user has had an entire user experience of the system, for example, downloading the mobile app, customer registration, product selection, and payment (Usadi et al. 2022, Yassierli, Vinsensius & Mohamed 2018). Three predictors of US are SQ, IQ, and SVQ. Previous studies that evaluated m-commerce applications using the model included Purwati et al. (2021), who found that US had a positive effect on NB, while a study by Amalina and Suryani (2020) found that US had no impact on NB. Based on the reviewed literature, this study hypothesised that:

> **H9:** User satisfaction has a positive relationship with net benefits.

Net benefits

Net benefits capture the gains of using an information system by the stakeholders (DeLone & McLean 2003). Stakeholders of an information system can be individual customers or an organisation. Shabila and Djamaludin (2022) are of the view that both the positive and negative benefits of an information system must be measured. The NB of an information system can be measured by observing how customers successfully make an online transaction (Mawarti & Seprina 2022) or measure the accrual of additional sales after the introduction of a new system (Amalina & Suryani 2020).

The relationship between the constructs of the model and the proposed hypotheses is presented in Figure 1. The model is adopted in this study to investigate the factors that inform how customers perceive m-commerce applications as successful.

Research method and design

This is a quantitative study underpinned by a positivist philosophy. The assumption of the study is informed by Guba and Lincoln (1994), who stated that knowledge can be
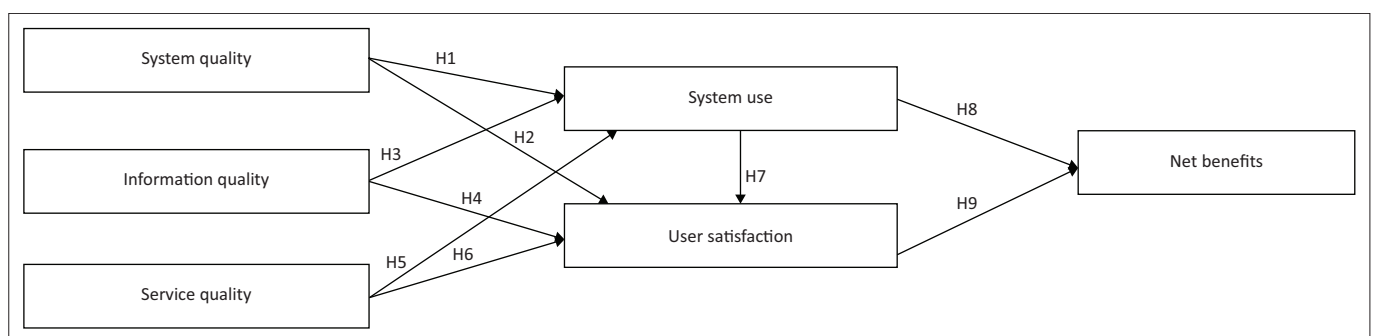
Source: Adapted from DeLone, W.H. & McLean, E.R., 2003, 'The DeLone and McLean model of information systems success: A ten-year update', *Journal of Management Information Systems* 19(4), 9–30. https://doi.org/10.1080/07421222.2003.11045748

H, hypothesis.

FIGURE 1: Research model.

acquired independently of the researcher and scientific tools can be utilised to collect data. In this study, data were collected to investigate the factors that inform how customers perceive m-commerce applications to streamline self-services as successful. Data were collected from customers of an m-commerce application for a telecommunication company in South Africa.

This study used a survey strategy to collect data. A Likert scale-rated questionnaire informed by the constructs of the DeLone and McLean IS (2003) model was constructed to collect data from customers who used the m-commerce application of a telecommunication company in South Africa. The questionnaire had seven sections: the first section collected demographic data, and the other six sections collected data to evaluate the constructs of the model: SQ, IQ, SVQ, SU, US, and NB. The questions asked on each construct were adapted from the literature:

- The SQ construct was tested with 11 questions focussed on functionality, usability, availability, reliability, responsiveness, and navigation (Kurt et al. 2022; Nani & Lina 2022; Rahman & Ekaputri 2021).
- The IQ was tested with 10 questions that focussed on usefulness, relevance, accuracy, conciseness, completeness, and currentness (Kurt et al. 2022; Malada 2022; Mkinga & Mandari 2020; Purwati et al. 2021).
- The SVQ was tested with eight questions that focussed on the help provided by the service provider when using the application (Nani & Lina 2022; Sari et al. 2021; Shabila & Djamaludin 2022).
- The SU was tested with nine questions that focussed on usability (Amalina & Suryani 2020; Mawarti & Seprina 2022).
- The US was tested with 11 questions that focussed on the features, needs, expectations, and performance of the App (Elsdaig & Nassar 2019; Itthiphone, Jo & Kwon 2020; Usadi et al. 2022).
- The NB were tested with six questions that focussed on information availability, anytime purchasing, advertisements, decision making, and cost management (Mawarti & Seprina, 2022; Shabila & Djamaludin 2022).

The questionnaire was rated on a Likert scale of 1 to 5, where 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree. The questionnaire was tested in a pilot with 15 participants who provided feedback and recommendations on the structure of the questions. The questionnaire was distributed through SurveyMonkey, an online platform.

The respondents to the survey were customers of a telecommunication company based in Centurion, Pretoria. A total of 178 (59%) participants responded to the survey from a total of 300 customers who were randomly selected from the customer databases and invited by email to participate in the survey. A total of 168 (56%) responses were completed with usable data. The response rate of 56% is acceptable for statistical analysis (Saunders, Lewis & Thornhill 2019).

The data was quantitatively analysed using the Smart PLS version 4 software package, and normality, reliability, and validity tests were performed. The data failed the normality test, and partial least squares structural equation modelling (PLS-SEM) was used to evaluate the model. The SEM process has two parts, namely a measurement model evaluation and a structural model assessment. The evaluation of the measurement model aimed to evaluate the validity and reliability of the variables. The evaluation of the structural model was performed to determine the explanatory power of the model to test the hypothesis developed about the relationships among the constructs (Hussein & Baharudin 2017).

Ethical considerations

Ethical approval to conduct this study was obtained from the Unisa College of Science, Engineering and Technology Ethics Review Committee. The ethical clearance number is 2021/CSET/SOC/030. Permission to conduct research with the customers of the telecommunication organisation was obtained from the chief information and technical officer of the department that deals with the provision of m-commerce services to clients. Non-disclosure agreements were signed with the company and obeyed in data collection and reporting.

Results

The following sections present demographic results, descriptive statistics of model constructs, reliabilities, and testing of hypotheses.

Demographic information

A total of 161 valid responses from the initial 168 were analysed, after 7 responses did not meet the validity test. Majority of the respondents 56.5% (91) were males, while 43.5% (70) were female, and 43.0% of respondents were between the age group of 35 and 44 years, and only one respondent was over the age of 65. Table 1 provides a summary of the demographic data of the sample, showing the age and frequency of use of mobile phones.

Descriptive statistics of the model

Table 2 provides descriptive statistics for the six constructs of the research model (DeLone & McLean 2003). The mean scores for the constructs ranged from 3.6366 to 4.0994, with SVQ having the lowest mean score (Mean = 3.6366, Standard Deviation = 0.83081). The results suggest that those who participated in the survey agreed that the m-commerce application for the telecommunication company was of good quality, useful, and satisfactory, and there are benefits associated with using it.

Reliability and validity of the measurement model

Table 3 presents measures for the internal consistency of the model, with composite validity (CR) and Cronbach's alpha

(α) above 0.7, which meets the recommendations of Pallant (2020). The convergent validity test produced values for extracted average variance (AVE) greater than 0.50, above an acceptable threshold value of 0.5 (Ravand & Baghei 2016). Furthermore, the factor loading of each item was also examined to evaluate the convergent validity of the measurement model. Cross-loading results were greater than 0.7, which met the recommended criteria (Hussein & Baharudin 2017). Because of page limitations, the results of factor loadings are not presented in this article.

The discriminant validity test applied the Fornell and Larcker (1981) criterion, which states that the AVE must be greater than the squared construct correlations, with a threshold below 0.90 as recommended by Hair and Alamer (2022). The results of discriminant validity are presented in Table 4. The diagonal values represent the AVE for the respective constructs, and the off-diagonal values represent the squared intercorrelation between the respective constructs.

Hypothesis testing

The results of the hypothesis testing are presented in Table 5, and all nine hypotheses were significant. Based on the R-squared value (R2), the model accounted for 72%, 77%, and 85% for the variances in NB, SU and US, respectively. Hair, Ringle and Sarstedt (2014) considered threshold R2 values of 0.75, 0.50, and 0.25 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. Since all the R2 values are > 0.70, they can be regarded as high.

Discussions

This study investigated factors that inform how customers perceive m-commerce applications to streamline customer self-services as successful. Data were collected from customers of an m-commerce application for a telecommunication company in South Africa. The constructs that measured the success of the telecommunication m-commerce application were SQ, IQ, SVQ, SU, US and NB. The findings of this study as presented in Table 5 are now discussed.

System quality

System quality was postulated to have a positive relationship with both SU (SQ → SU) and US (SQ → US). The path between the variables SQ → SU was significant (β = 0.334, p < 0.05) supporting H1. Furthermore, the path between the variables SQ → US was significant (β = 0.116, p < 0.05) and supported H2. Descriptive statistics for the Likert scale ratings for the variables were as follows: SQ (Mean = 4.0736; Std = 0.719), SU (Mean = 3.906; Std = 0.729), and US (Mean = 3.871; Std = 0.777).

The results for H1 (SQ → SU) are interpreted to mean that the users of the m-commerce application would use the application if the quality of the service meets their expectations. System quality was broadly measured through attributes

that included security, performance, reliability, and usability (Nani & Lina 2022; Yoo 2020). On the other hand, results for H2 (SQ → US) means that the users of the m-commerce applications would be satisfied with using the m-commerce application if its quality meets their expectations.

The findings of this study support the results of previous studies that found a significant relationship on the path SQ → SU (Al-Adwan et al. 2021; Alyoussef 2023; Sari et al. 2021) and SQ → US (Gurendrawati et al. 2022; Malada 2022; Nani & Lina 2022). However, the finding of this study

TABLE 1: Demographic data (N = 161).

Characteristics	Categories	Total	%
Gender	Female	70	43.5
	Male	91	56.5
Age (years)	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
Mobile App use frequency	Daily	69	42.9
	A few times per week	19	11.8
	Weekly	12	7.5
	2 to 3 times per month	24	14.9
	Monthly	17	10.6
	Not consistently	20	12.4

App, application.

TABLE 2: Descriptive statistics for the constructs (N = 161).

Constructs	Minimum	Maximum	Mean	Standard deviation
SQ	1.00	5.00	4.0736	0.71964
IQ	1.00	5.00	4.0994	0.63618
SVQ	1.00	5.00	3.6366	0.83081
SU	1.00	5.00	3.9068	0.72955
US	1.00	5.00	3.8718	0.77796
NB	1.00	5.00	3.7867	0.86767

SQ, system quality; IQ, information quality; SVQ, service quality; SU, system use; US, user satisfaction; NB, net benefits.

TABLE 3: Cronbach alpha (α), composite validity and average variance results.

Constructs	Cronbach α	CR	AVE
IQ	0.937	0.939	0.668
NB	0.938	0.939	0.765
SQ	0.925	0.927	0.690
SU	0.930	0.933	0.644
SVQ	0.890	0.892	0.646
US	0.958	0.960	0.707

SQ, system quality; IQ, information quality; SVQ, service quality; SU, system use; US, user satisfaction; NB, net benefits; CR, composite validity; AVE, average variance.

TABLE 4: Discriminant validity.

Constructs	IQ	NB	SQ	SU	SVQ	US
IQ	**0.817**	-	-	-	-	-
NB	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**

SQ, system quality; IQ, information quality; SVQ, service quality; SU, system use; US, user satisfaction; NB, net benefits.
Significant at p < 0.05.

TABLE 5: Structural equation modelling standardised path coefficients.

Hypothesis	Relationship	Path coefficients	p
H1	SQ → SU	0.334	0.000
H2	SQ → US	0.116	0.000
H3	IQ → SU	0.227	0.000
H4	IQ → US	0.182	0.000
H5	SVQ → SU	0.457	0.000
H6	SVQ → US	0.201	0.000
H7	SU → US	0.521	0.000
H8	SU → NB	0.328	0.000
H9	US → NB	0.542	0.000

Note: R-squared adjusted, NB = 0.721; SU = 0.770; US = 0.849.
SQ, system quality; IQ, information quality; SVQ, service quality; SU, system use; US, user satisfaction; NB, net benefits.
Significant at $p < 0.05$.

contradicts studies that found insignificant relationships on the path SQ → SU (Kurt et al. 2022; Yoo 2020) as well as SQ → US (Kurt et al. 2022; Yoo 2020).

From the findings of hypotheses H1 and H2, we learn that an m-commerce application is successful if customers perceive it as having acceptable SQ. It was inferred that adequate SQ influences customers to satisfactorily use the application.

Information quality

Information quality was hypothesised to positively determine SU (IQ → SU) and US (IQ → US). The path IQ → SU was significant ($\beta = 0.116$, $p < 0.05$) supporting H3, and the path IQ → US was significant ($\beta = 0.227$, $p < 0.05$) supporting H4. The descriptive Likert scale ratings for the variables were as follows: IQ (Mean = 4.099; Std = 0.636), SU (Mean = 3.906; Std = 0.729), and US (Mean = 3.871; Std = 0.777).

Results of the H3 (IQ → SU) revealed that an m-commerce application that provides good IQ will be used by the customers to achieve their goals. An m-commerce application that provides good IQ is perceived as providing information that is relevant, concise, current, and usable (Alshikhi & Abdullah 2018; Rieh 2002). Moreover, H4 (IQ → US) results uncovered that an m-commerce application that provides good IQ satisfies customers. The findings of this study satisfy the proposition of this study and are aligned with the results of empirical studies that found significant relationships on the paths IQ → SU (Elsdaig & Nassar 2019; Sari et al. 2021) and IQ → US (Kurt et al. 2022; Purwati et al. 2021; Usadi et al. 2022). However, the findings of this study contradict research that found an insignificant relationship on the paths IQ → SU (Angelina et al. 2019).

From the findings of H3 and H4, we learn that the IQ that the m-commerce application provides to customers influences its success. To be successful, the m-commerce application should intelligently store, process and provide information that meets the needs of customers for knowledge acquisition and decision making (Rieh 2002).

Service quality

Service quality was hypothesised to determine SU (SVQ → SU) and US (SVQ → US). The path SVQ → SU was significant ($\beta = 0.457$, $p < 0.05$) supporting H5, and the path SVQ → US was significant ($\beta = 0.201$, $p < 0.05$) supporting H6. The descriptive Likert scale ratings for the variables were as follows: SVQ (Mean = 3.636; Std = 0.830), SU (Mean = 3.906; Std = 0.729), and US (Mean = 3.871; Std = 0.777). The mean score for SVQ is slightly above 3 (neutral), which shows that some respondents were neutral and some agreed that it was an important factor that determined the success of the m-commerce application for the telecommunication company.

Results of H5 (SVQ → SU) tell us that the users of an m-commerce application will use the application if they perceive the quality of service provided to them as good. Since the mean score of SVQ (Mean = 3.636) is slightly above neutral (3), some users are undecided and are likely to use the application even if the service provided is not good. A possible reason could be that customers who primarily access information through mobile devices have no other option than the m-commerce application to access self-services.

Hypothesis 6 (SVQ → US) results revealed that if users of the m-commerce application perceive that they are provided with good SVQ, they are satisfied with using the application. The results can be interpreted to mean that if the online service provider is actively providing online support and is responsive to queries, customers will be satisfied with the quality of the m-commerce application. The findings are aligned with studies that found significant relationships on the paths SVQ → SU (Mkinga & Mandari 2020), and SVQ → US (Gurendrawati et al. 2022; Usadi et al. 2022). However, the findings of this study contradict those of Amalina and Suryani (2020), who found an insignificant relationship on the path SVQ → SU, and Itthiphone et al. (2020) found an insignificant relationship on the path SVQ → US.

From the findings of H5 and H6, we learn that customer perceptions on the quality of service that they receive from a service provider determines if they will use an m-commerce application. Furthermore, the satisfaction that customers receive from using an m-commerce application is enhanced by the quality of service that they receive from the service provider.

System use

System use was hypothesised to determine US (SU → US) and NB (SU → NB). The path SU → US was significantly positive ($\beta = 0.521$, $p < 0.05$) supporting H7. Additionally, the path SU → NB was significantly positive ($\beta = 0.328$, $p < 0.05$) supporting H8. The descriptive Likert scale ratings for the variables were as follows: SU (Mean = 3.906; Std = 0.729), US (Mean = 3.871; Std = 0.777) and NB (Mean = 3.786; Std = 0.867).

Hypothesis 6 (SU → US) results revealed that users would frequently use an m-commerce application if their expectations were met and satisfied. Furthermore, the results of H7 (SU → NB) tell us that the investment made by users, for example, effort in using an m-commerce application, can be realised as NB. Therefore, an m-commerce application that

has a good SU can potentially increase NB and US. The result of this study supports previous studies that found a significant and positive relationship on both paths SU → US and SU → NB (Mawarti & Seprina 2022; Singh, Sinha & Liébana-Cabanillas 2020). However, the findings of this study contradict Amalina and Suryani (2020), who found an insignificant relationship on both SU → US and SU → NB. From the results of H6 and H7, we learn that if users frequently use an m-commerce application, their US and SU increase, which, in turn, increase the NB of the service provider.

User satisfaction

User satisfaction was hypothesised to determine NB (US → NB). The path US → NB was significant and positive ($\beta = 0.542$, $p < 0.05$) supporting H9. The descriptive Likert scale ratings for the variables were as follows: US (Mean = 3.871; Std = 0.777) and NB (Mean = 3.786; Std = 0.867).

Results of H9 (US → NB) revealed that a positive increase in perceived US with using an m-commerce application resulted in customers having greater NB. If users of an m-commerce application perceive the quality of the information and services provided to be good, they are highly likely to be satisfied, continue using the application, and gain more benefits. In contrast, the opposite will be true; if users perceive the services provided by an m-commerce application as not satisfactory, they will not use it and will not get any benefits. The findings are aligned with previous studies that found a significant and positive relationship on the path US → NB (Elsdaig & Nassar 2019; Pratomo et al. 2021). From the results of H9, we learnt that the success of an m-commerce application can be increased if service providers of an m-commerce application ensure that functional and non-functional features of an application satisfy user needs. In addition, m-commerce service providers must provide quality service support to increase customer satisfaction.

Limitations

The study was conducted on a single m-commerce application that belongs to one company; therefore, the findings may not be applicable to the m-commerce applications of other companies or industries. The DeLone and McLean IS success model constructs (DeLone & McLean 2003) were employed to evaluate the success of the m-commerce application, which do not evaluate success in terms of financial benefits. Future research could focus on two things. Firstly, to extend the DeLone and McLean model to incorporate financial constructs so that the success of m-commerce applications for streamlining customer self-service can be evaluated using financial metrics. Secondly, collect data from more than one company to overcome the sample size limitation experienced in this study.

Conclusions

This study investigated the factors that inform how customers perceive m-commerce applications for streamlining self-

services as successful. Data were collected from customers who use an m-commerce application for a telecommunication company in South Africa. The DeLone and McLean IS success model (DeLone & McLean 2003) was adopted and nine (9) hypotheses were tested on the constructs SQ, IQ, SVQ, SU, US and NB. All hypotheses tested had positive and significant relationships, which means that the m-commerce application tested in this research can be considered a success. The practical implications of the results are that the factors that include SQ, IQ, SVQ, SU, and US have a significant impact on providing a successful m-commerce application. These are the factors that m-commerce service providers should implement to provide successful m-commerce applications to streamline customer self-services. Successful m-commerce applications are beneficial because they lead to increased adoption of m-commerce applications by customers.

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References

Al-Adwan, A.S., Albelbisi, N.A., Hujran, O., Al-Rahmi, W.M. & Alkhalifah, A., 2021, 'Developing a holistic success model for sustainable e-learning: A structural equation modeling approach', *Sustainability* 13(16), 9453. https://doi.org/10.3390/su13169453

Alshikhi, O.A. & Abdullah, B.M., 2018, 'Information quality: Definitions, measurement, dimensions, and relationship with decision making', *European Journal of Business and Innovation Research* 6(5), 36–42.

Alyoussef, I.Y., 2023, 'Acceptance of e-learning in higher education: The role of task-technology fit with the information systems success model', *Heliyon* 9(3), 1–19. https://doi.org/10.1016/j.heliyon.2023.e13751

Amalina, D. & Suryani, E., 2022, 'Evaluating the success of E-invoice implementation at a State-Owned Enterprise using DeLone & McLean IS success model', *IPTEK Journal of Proceedings Series* 1, 388–396. https://doi.org/10.12962/j23546026.y2020i1.11937

Angelina, R.J., Hermawan, A. & Suroso, A.I., 2019, 'Analyzing e-commerce success using DeLone and McLean model', *Journal of Information Systems Engineering and Business Intelligence* 5(2), 156–162. https://doi.org/10.20473/jisebi.5.2.156-162

Chipangura, B., 2016, *A framework for providing mobile centric services to students at higher education institutions: The case of open distance learning*, PHD thesis, Sch. of Computing, University of South Africa.

DeLone, W.H. & McLean, E.R., 2003, 'The DeLone and McLean model of information systems success: A ten-year update', *Journal of Management Information Systems* 19(4), 9–30. https://doi.org/10.1080/07421222.2003.11045748

DeLone, W.H. & McLean, E.R., 2004, 'Measuring e-commerce success: Applying the DeLone & McLean information systems success model', *International Journal of Electronic Commerce* 9(1), 31–47. https://doi.org/10.1080/10864415.2004.11044317

Elsdaig, M. & dua'A.N., 2019, 'Evaluation of healthcare information system using Delone and McLean quality model, case study KSA', *International Journal of Advanced Trends in Computer Science and Engineering* 8(1.4), 522–527. https://doi.org/10.30534/ijatcse/2019/8181.42019

Eybers, S.S., 2015, *Exploring the value of business intelligence using a second generation balanced scorecard approach*, PHD thesis, Sch. of Computing, University of South Africa.

Fornell, C. & Larcker, D.F., 1981, 'Evaluating structural equation models with unobservable variables and measurement error', *Journal of Marketing Research* 18(1), 39–50. https://doi.org/10.1177/002224378101800104

Guba, E.G. & Lincoln, Y.S., 1994, 'Competing paradigms in qualitative research', in N.K. Denzin & Y.S. Licoln (eds), *Handbook of qualitative research*, 2nd edN., pp. 163–194, Sage, London.

Gurendrawati, E., Sasmi, A.A., Ulupui, I.G.K.A., Murdayanti, Y., Anwar, C. & Wahyuningsih, I.T., 2022, 'The DeLone and McLean model on user satisfaction of academic service systems', *Jurnal Pendidikan Ekonomi Dan Bisnis (JPEB)* 10(1), 87–99. https://doi.org/10.21009/JPEB.010.1.8

Hair, J. & Alamer, A., 2022, 'Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example', *Research Methods in Applied Linguistics* 1(3), 10002. https://doi.org/10.1016/j.rmal.2022.100027

Hair, J.F., Ringle, C.M. & Sarstedt, M., 2014, 'Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance', *Long Range Planning* 47(6), 392. https://doi.org/10.1016/j.lrp.2013.08.016

Hussein, L.A. & Baharudin, A.S., 2017, 'Factors affecting small and medium enterprises (SMEs) continuance intention to adopt e-commerce in Jordan', *International Journal of Advanced and Applied Sciences* 4(4), 10–117. https://doi.org/10.21833/ijaas.2017.04.016.

Justino, M., Tengeh, R. & Twum-Darko, M., 2021, 'A conceptual framework for the adoption of m-commerce by brick-and-mortar retailers', *FORCE: Focus on Research in Contemporary Economics* 2(2), 93–115.

Itthiphone, V., Jo, D. & Kwon, C., 2020, 'Determinants of continuance intention in mobile payment services: Based on the is success model', *Journal of Internet Computing and Services* 21(5), 87–95.

Kurt, K., Aktaş, B., & Turan, A. (2022). Understanding online shopping continuance intention of turkish users: an empirical assessment. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi* (50), 144–160. https://doi.org/10.30794/pausbed.1003073

Lakhani, S., 2020, 'A brief guide to building successful mobile apps', *Forbes*, viewed 07 February 2024, from https://www.forbes.com/sites/forbestechcouncil/2020/04/07/a-brief-guide-to-building-successful-mobile-apps/?sh=3dfd3bb654c6.

Legner, C., Nolte, C. & Urbach, N., 2011, 'Evaluating mobile business applications in service and maintenance processes: Results of a quantitative-empirical study', *ECIS Proceedings* 247, viewed 03 June 2024, from http://aisel.aisnet.org/ecis2011/247.

Malada, L.P., 2022, 'Factors affecting continuous interest in using the mobile application BPJSTKU (Survey: Workers of PT Mitsubishi Motors Krama Yudha Indonesia, Cikarang)', *Dinasti International Journal of Digital Business Management* 3(2), 195–204. https://doi.org/10.31933/dijdbm.v3i2.1119

Mawarti, M. & Seprina, I., 2022, 'Success analysis of academic information system (SIAKAD) using Delone and Mclean Models (Case Study of STIHPADA Palembang)', *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)* 5(3), 26456–26471. https://doi.org/10.33258/birci.v5i3.6691

Mkinga, M. & Mandari, H., 2020, 'Evaluating students information system success using DeLone and McLean's model: Student's perspective', *Journal of International Technology and Information Management* 29(2), 24–42. https://doi.org/10.58729/1941-6679.1447

Nani, D.A. & Lina, L.F., 2021, 'Determinants of continuance intention to use mobile commerce during the emergence of COVID-19 in Indonesia: DeLone and McLean Perspective', *Sriwijaya International Journal of Dynamic Economics and Business* 5(3), 261–272. https://doi.org/10.29259/sijdeb.v5i3.261-272

Pallant, J., 2020, *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*, 7th edn., Routledge, London.

Petter, S., DeLone, W. & McLean, E., 2008, 'Measuring information systems success: Models, dimensions, measures, and interrelationships', *European Journal of Information Systems* 17(3), 236–263. https://doi.org/10.1057/ejis.2008.15

Prajapati, S.G., 2020, 'Relationship of service quality and customer satisfaction among youngsters for a telecommunication service of reliance', *Jio Infocomm Limited at Vadodara City* 18, 64–72.

Pratomo, A.H., Agusdin, R.P., Tahalea, S.P. & Cahyana, N.H., 2021, 'Implementation DeLone & McLean IS success model for research and community service management information system evaluation', *Techno LPPM* 7(2), 141–150.

Purwati, A.A., Mustafa, Z. & Deli, M.M., 2021, 'Management information system in evaluation of BCA mobile banking using DeLone and McLean model', *Journal of Applied Engineering and Technological Science (JAETS)* 2(2), 70–77. https://doi.org/10.37385/jaets.v2i2.217

Rahman, A. & Ekaputri, A., 2021, 'Analysis of web-based accounting systems based on the theory of Delone and McLean', *Prosiding International Conference on Sustainable Innovation (ICoSI)* 1(2), 21–23.

Ravand, H. & Baghaei, P., 2019, 'Partial least squares structural equation modeling with R', *Practical Assessment, Research, and Evaluation* 21(1), 11. https://doi.org/10.7275/d2fa-qv48

Rieh, S.Y., 2002, 'Judgment of information quality and cognitive authority in the Web', *Journal of the American Society for Information Science and Technology* 53(2), 145–161. https://doi.org/10.1002/asi.10017

Sanchez, G., 2013, *PLS path modeling with R*, UC Berkeley, Berkeley, CA.

Sari, D.I.N., Hidayatullah, S. & Prasetya, E.D.A., 2021, 'Evaluation of the implementation of IBM IOC using the Delone and Mclean Model', *Journal of Innovation and Applied Technology* 7(02), 1306–1320. https://doi.org/10.21776/ub.jiat.2021.006.02.14

Saunders, M., Lewis, P. & Thornhill, A., 2019, *Research methods for business students*, 8th edn., Pearson Education Limited, Harlow.

Shabila, F. & Djamaludin, M.D., 2022, 'Analysis of satisfaction level and net benefit IPB undergraduate students towards the use IPB mobile for student application', *Journal of Child, Family, and Consumer Studies* 1(2), 131–141. https://doi.org/10.29244/jcfcs.1.2.131-141

Singh, N., Sinha, N. & Liébana-Cabanillas, F.J., 2020, 'Determining factors in the adoption and recommendation of mobile wallet services in India: Analysis of the effect of innovativeness, stress to use and social influence', *International Journal of Information Management* 50, 191–205. https://doi.org/10.1016/j.ijinfomgt.2019.05.022

Usadi, M.P.P., JS, P.W.D. & Permadi, I.P.O., 2022, 'Predicting switching intention among generation Y using DeLone & McLean (Study on Shopee App)', *E-Mabis: Jurnal Ekonomi Manajemen dan Bisnis* 23(2), 98–108. https://doi.org/10.29103/e-mabis.v23i2.865

Whyte, G. & Bytheway, A., 1996, 'Factors affecting information systems' success', *International Journal of Service Industry Management* 7(1), 74–93 . https://doi.org/10.1108/09564239610109429

Yassierli, Y., Vinsensius, V. & Mohamed, M.S., 2018, 'The importance of usability aspect in M-commerce application for satisfaction and continuance intention', *Makara Journal of Technology* 22(3), 149–158 https://doi.org/10.7454/mst.v22i3.3655

Yoo, J., 2020, 'The effects of perceived quality of augmented reality in mobile commerce – An application of the information systems success model', *Informatics* 7(2), 14. https://doi.org/10.3390/informatics7020014