THE INFLUENCE OF QUALITY ON THE SUCCESS OF E-COMMERCE SYSTEMS

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Abstract

Appraising the success of information systems has long been a difficulty for management. Indeed, the definition of "success" is controversial as the term itself is multi-dimensional and can be assessed at various levels of the organisation using many differing criteria. However, the development of validated evaluation metrics is critical to future decision making for e-commerce success. This research addresses difficulties in measuring e-commerce success by implementing the DeLone and McLean (D&M) model of IS success (1992, 2003) in an e-commerce environment. This research considers the influence of quality on e-commerce success by measuring the information quality and system quality attributes of an e-commerce system and the intention to use, user satisfaction and intention to transact from a sample of respondents.

This research provides one of the first empirical e-commerce applications of the updated IS success model proposed by DeLone and McLean (2003). This paper found significant relationships between Information Quality and System Quality and three success dimensions: intention to use, user satisfaction intention to transact. This study found the following information and system quality constructs to be most important in predicting e-commerce success: ease of understanding, personalisation and reliability. In particular, this research found that reliability is more important than usability where transactions are concerned and security is important to transactional zones of e-commerce systems, but is not the most important factor.

Keywords: Internet e-commerce systems, success, DeLone and McLean IS Success Model, information quality, system quality.

1 INTRODUCTION

Measuring the success of information systems is critical to the process of evaluating IS strategies and investments. However, a comprehensive evaluation framework has been difficult to define and the identification of a dependant variable has remained elusive. Companies experience particular difficulty in evaluating the success of e-commerce initiatives resulting in a significant barrier to entry for many businesses particularly small to medium sized enterprises. The updated success model proposed by DeLone and McLean (2003) (D&M IS success model) provides guidance for development in this area, especially as a model for developing comprehensive e-commerce success measures. This paper attempts to respond to the call made by DeLone and McLean (2003) for empirical studies to measure the interaction between success dimensions in order to isolate the effect of particular independent variables. Specifically, this paper provides one of the first e-commerce applications of the updated IS success model and explores the relationships that exist between factors of information and system quality and e-commerce success metrics.

2 THEORETICAL BACKGROUND

The difficulties posed in assessing the success of an online presence as espoused by Hasan and Tibbits (2000) in that the system implemented must make a measurable contribution, implies that the measurement of the success of the system is fundamental to the ability of management to determine the contribution to business. Zhang et al (2000) proposed that validated evaluation criteria would be critical to future decision making for online systems design. However the definition of "success" is controversial as the term itself is multi-dimensional and can be assessed at various levels of the organisation using many differing criteria.

DeLone and McLean (1992) sought to better define the dependant variable "success" in information systems by categorising six interrelated dimensions of IS success – System Quality, Information Quality, Use, User Satisfaction, Individual Impact and Organisational Impact – and encouraged future studies to acknowledge the multidimensional, interdependent and contextual nature of IS success. This model informed a large number of studies and has been updated as the D&M IS success model (2003) to include the variables "service quality" and "net benefits".

DeLone and McLean (2003) also demonstrated the possibility of adapting their IS success model to the e-commerce environment. It is argued that, as the DeLone and McLean Model (D&MM) is based on communications theory, it is highly suited to measuring the IS and communications phenomenon that is the Internet. This process model, (as shown in Figure 1) is derived from a well accepted and tested model of information systems' success (Molla and Licker, 2001; Seddon and Kiew, 1994) and is argued to be appropriate to the communications and commerce process common to e-commerce systems.

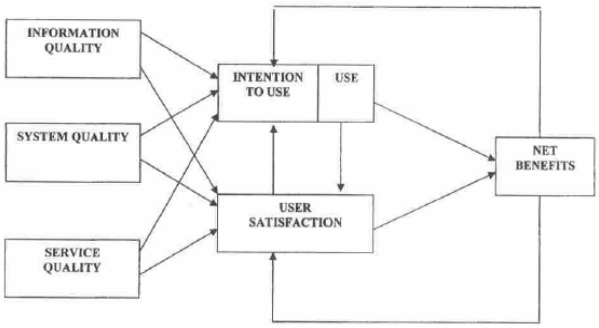

Figure 1: Updated D&M IS Success Model (2003)

2.1 Measures of IS Quality

Delone and McLean (2003) encourage the selection of success dimensions and measures contingent on the objectives and context of the system under study. In terms of e-commerce systems, information quality and system quality have been identified as critical features of determining web site success (Zhang et al., 2000; Bell and Tang, 1998).

Information quality aspects of a system are a measure of the information system outputs, the primary example of such being the production of reports (DeLone and McLean, 1992). E-commerce system users may seek transactional, customer service and marketing services as well as information such that account must be taken of the features distinguishing e-commerce systems from conventional information systems (Molla and Licker, 2001).

A distinct measurement of information quality remains elusive (Lee et al., 2002 at p.143; Wand et al., 1996 at p. 87) yet the concept is accepted as a critical concern of management (Lee et al., 2002). The concept is especially important in the context of e-commerce as the provision of information is the basic goal of any web site (Huizingh, 2000). It has been identified as a factor in information system success (DeLone and McLean, 1992), in web site home page performance (Zang et al., 2000) and in web site success in the context of electronic commerce (Liu et al., 2000). It is sometimes referred to as data quality (Wand et al., 1996) or information content (Ranganathan and Ganapathy, 2002).

Many attributes of the Information Quality concept have been proposed and measured in various types of studies. (Accuracy: Zhang et al., 2000; Timeliness: McKinney et al., 2002; Reliability: McKinney et al., 2002, DeLone and McLean, 1992; Relevance: McKinney et al., 2002; Scope: McKinney et al., 2002, Lohse & Spiller, 1998, Huizingh, 2002). It has been described as a multi-dimensional concept, (Wand et al., 1996; Lee et al., 2002) and in identifying it as a dimension of web quality, Aladwani and Prashant (2002) suggest its measurement should be multi-dimensional in nature also. The updated D&M IS success model provides five information quality constructs of e-commerce success that will be considered for use in this study: Completeness, Ease of Understanding, Personalisation, Relevance, and Security.

The second feature of online quality is the quality of the system serving that information. System quality refers to the measurement of the information processing system (Negasha et al., 2003; DeLone and McLean, 1992). In this case the information processing system is the company's online presence. Some researchers refer to system quality as the ease of finding the information on the system (Keevil, 1998). The failure of an online system will cause a user to "mouse-click away" resulting in non-use (Molla and Licker, 2001). Thus, online system quality contains traditional system quality attributes such as reliability, accuracy, flexibility, response time and ease of use (DeLone and McLean, 1992) as well as the more encompassing concept of seamless site performance (Molla and Licker, 2001). The updated D&M IS success model provides for five system quality constructs of e-commerce success that will be considered for use in this study: Usability, Availability, Reliability, Adaptability and Response Time.

2.2 Measures of IS Success

In the context of Internet e-commerce, the success of the system must necessarily be based on the goals of the management of that system (Hasan and Tibbit, 2000). The role of context has been stressed as important in the explanation of system success (DeLone and McLean, 1992; DeLone and McLean, 2003). Seddon (1997) argued that use may be a goal in itself or a means to an end, thus use may be equated with success if use is the goal as set by the stakeholder. In the context of online commerce, the success of the system must necessarily be based on the goals of the management of that system.

The choice of success constructs is contingent on the objective of the study (management or stakeholder objectives) or the context of the organisation (DeLone and McLean, 2003). Past measures

have included number of hits, sales leads generated, and revenue (Golden, Hughes and Gallagher, 2003), number of queries received, number of hits and constructive feedback (Webb and Sayer, 1998). This suggests that queries received, hits and feedback were what held value for the stakeholders. A hit may become a query that generates a sales lead, which develops into revenue. Thus, a 'hit' may not be sufficient to cause revenue but remains necessary. Without the original 'hit', no revenue could be generated. DeLone and McLean (2003) posited that success, in this context, should be determined with reference to the nature of the systems' use, the patterns of user navigation, number of site visits and the number of transactions executed.

3 RESEARCH FRAMEWORK

The research framework below (Figure 2), adapted from the D&M IS success model, is based on the many studies that have validated the model (Seddon and Kiew, 1994; Seddon, 1997; Taylor and Todd, 1995) and the extension of this model to the e-commerce context (Molla and Licker, 2001). The constructs representing Information Quality, System Quality and Online Success have been selected from the literature, contingent on the context and objectives of the investigation and are presented below.

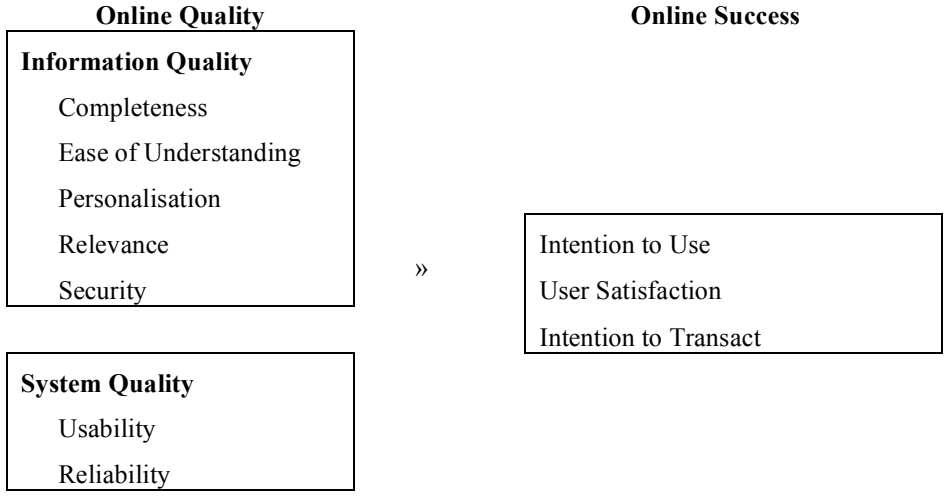

Figure 2: Research framework

In the context of the above framework, the following hypotheses are posited.

Hypotheses
H1 : Information Quality has a positive influence on Intention to Use
H2 : Information Quality has a positive influence on User Satisfaction
H3 : Information Quality has a positive influence on Intention to Transact
H4 : System Quality has a positive influence on Intention to Use
H5 : System Quality has a positive influence on User Satisfaction
H6 : System Quality has a positive influence on Intention to Transact

Table 1: Hypotheses - The influence of quality on success

3.1 Research Instrument

In order to measure the factors of online quality and system success, a research instrument, consisting of two questionnaire surveys, were compiled from existing, tested and verified instruments. The pre-task questionnaire was administered to the sample before they were directed to begin with the subject system. Certain tasks were then provided to the sample to attempt and the post-task questionnaire was then provided to the sample for completion.

The pre-task questionnaire, using adapted components of the Questionnaire for User Interface Satisfaction (QUIS), collected information about the respondents' past experience on the Internet, their level of confidence in various aspects of Internet usage and the importance of various aspects of computing technologies. The post-task questionnaire was developed from a pool of 206 items collated from an extensive review of the literature. In order to determine the most rigorous of these items it was determined whether each study had tested the instrument for validity, reliability, whether a pilot had been conducted and whether the system under study was Internet-based. A final instrument of 62 items was thus created. Both of these questionnaires were measured using a seven-point Likert scale.

3.2 Research Process

The research instrument was tested using a sample of twenty-seven graduate students from a university (13 female, 11 male, mean age = 25.67, SD = 5.033). Data collection was carried out by distributing the questionnaires to the sample before and after completion of predetermined tasks in a computer laboratory. The research process consisted of three aspects. A pre-task questionnaire was distributed to help inform the findings from the post-task questionnaire. To determine the quality of a system or its success the participants must have an awareness of the workings of that system. Thus, four tasks were designed to a) create a user account, b) upload pictures into an album, c) share that album, and d) attempt a purchase of prints until payment details were requested. After completion of these tasks the participants were then asked to complete the post-task questionnaire. A photographic e-commerce system was chosen for the basis of this study. It was chosen for the potential to allow e-commerce oriented tasks and the suitability in measuring the constructs of online quality as defined by this study.

4 RESULTS

Composite constructs were created using the SPSS 'compute' command to produce un-weighted means of each of the constructs items. These scores were then recoded into numeric variables in SPSS. Reliability analysis using Cronbach's Alpha for the composite constructs are presented below.

Construct (No. of items)		□ (Individual)	**Composite (No. of items)**		□ (Composite)
Completeness	(5)	0.88			
Ease of understanding	(5)	0.89			
Personalisation	(5)	0.88			
Relevance	(5)	0.84			
Security	(4)	0.94	**Information Quality**	**(24)**	0.95
Usability	(6)	0.89			
Reliability	(5)	0.93	**System Quality**	**(11)**	0.90

Intention to Use	(8)	0.94			
User Satisfaction	(5)	0.92			
Intention to Transact	(5)	0.88	**System Success**	**(18)**	0.95

Table 2: Reliability analyses for constructs and composites

Using SPSS 12.0.1 linear regression analyses were carried out on the individual constructs with respect to the success variables as an exploration of the relationships with the dependent variables. Then, to determine the inter-relationships and interplay between the constructs and to verify the logic of the research framework MANOVA analyses were carried out. Regression was completed for all thirty-one combinations of the five independent variables of information quality. The Adjusted R^2 values and significance levels computed for each of the 31 combinations of the composite variables, with Intention to Use as the dependent variable, were entered into a spreadsheet. The data were ordered by the level of significance, then by the Adjusted R^2 value. This produced a table with the most significant relationships at the top with the corresponding greatest Adjusted R^2 values. The most significant of the combinations, with Intention to Use as the dependent variable, was {Completeness, Personalisation} (Adj. $R^2 = 0.212$). The combination of five composite independent variables were not significant. The individual composites that were the strongest predicators were Personalisation (Adj. $R^2 = 0.206$ at the 0.05 level); Security (Adj. $R^2 = 0.168$ at the 0.05 level); and Completeness (Adj. $R^2 = 0.135$ at the 0.05 level) respectively.

4.1 Intention to Use

Multiple regression taking Intention to Use as dependent variable indicate that, of the information quality (IQ) constructs, Personalisation is the most influential (Adj. $R^2 = 0.206$). The elimination of Completeness resulted in a higher F value ($F = 6.969$, $p < 0.05$). The final model indicated Intention to Use is most dominantly influenced by Personalisation ($\beta = 0.49$, $p < 0.05$).

Similarly, multiple regression analysis was carried out with the constructs of system quality (SQ) as independent variables. This process was completed for the three possible combinations of the two independent variables representing system quality. The Adjusted R^2 values and significance levels computed for each of the 3 combinations of the composite variables with Intention to Use as the dependent variable were entered into a spreadsheet. The data were ordered by the level of significance, then by the Adjusted R^2 value. The combination of Usability and Reliability was the strongest predicator with an Adj. R^2 value of 0.212 ($p < 0.05$). The individual Independent variables relationships with Intention to Use were both significant, Usability Adj. $R^2 = 0.191$ ($p < 0.05$); and Reliability Adj. $R^2 = 0.111$ ($p < 0.1$) respectively.

Multiple regression analyses taking Intention to Use as dependent variable indicate that Usability is the most influential construct with Adj. $R^2 = 0.191$. The final model indicated Intention to Use is most dominantly influenced by Usability ($\beta = 0.476$, $p < 0.05$). From an analysis of the beta coefficients a ranking of the influencing factors may be determined.

	Information Quality		System Quality
1	Personalisation	1	Usability
2	Completeness	2	Reliability
3	Security		
4	Relevance		
5	Ease of Understanding		

Table 3: Ranking of quality factors which influence Intention to Use.

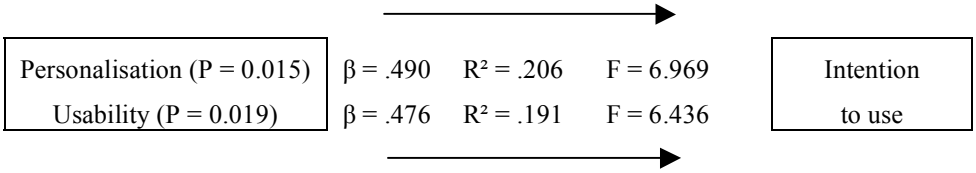

Figure 3. The influence of information quality on Intention to Use.

4.2 User Satisfaction

A table of relationships sorted by Adjusted R^2 and significance was created with User Satisfaction as the dependent variable. All 31 IQ combinations were found to be significant at the 0.05 confidence level. The combination of all five factors of information quality resulted in a high Adj. R^2 value of 0.342 ($p < 0.05$). The highest Adj. R^2 value found was {Ease of Understanding, Personalisation} ($p \leq 0.001$).

Multiple regression analyses taking User Satisfaction as the dependent variable indicate that Ease of Understanding and Personalisation are the most influential constructs. The elimination of Completeness from the model resulted in a higher F value ($F = 9.261$, $p < 0.05$). The final model indicated User Satisfaction is most dominantly influenced by Ease of Understanding (□= 0.412, $p < 0.05$) and less so by Personalisation (□= 0.391, $p < 0.05$).

The combined SQ composite variable {Usability, Reliability} was found to be the strongest predicator of User Satisfaction (Adj. $R^2 = 0.291$ at $p < 0.05$). The relationships of the individual variables were also strong, {Usability} Adj. $R^2 = 0.257$ ($p < 0.05$), and {Reliability} Adj. $R^2 = 0.187$ ($p < 0.05$).

Multiple regression analyses taking User Satisfaction as dependent variable with the constructs of System Quality as independent variables indicate that Usability is the most influential construct with Adj. $R^2 = 0.257$. The final model indicated User Satisfaction is most dominantly influenced by Usability (□= 0.538, $p < 0.05$).

	Information Quality		System Quality
1	Ease of Understanding	1	Usability
2	Personalisation	2	Reliability
3	Completeness		
4	Relevance		
5	Security		

Table 4. Ranking of quality factors which influence User Satisfaction

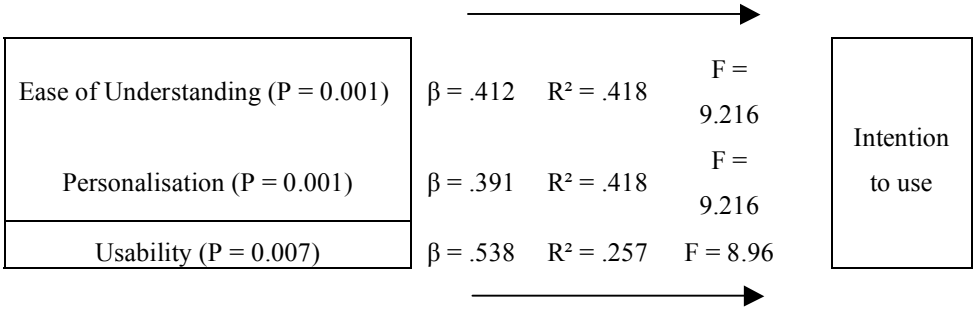

Figure 4. The influence of quality on User Satisfaction

4.3 Intention to Transact

The combined composite IQ variable {Ease of understanding, Personalisation} was found to be the strongest predicator of Intention to Transact (Adj. $R^2 = 0.533$ at $p < 0.05$). The combination of the five composites with Intention to Transact as the dependent variable resulted in a strong Adj. R^2 value of 0.485 ($p < 0.05$).

Multiple regression analyses taking Intention to Transact as the dependent variable indicate that Ease of Understanding and Personalisation are the most influential IQ constructs. A higher Adj. R^2 value resulted when Security was eliminated from the analysis ($F = 14.106$, $p < 0.05$). The final model indicated Intention to Transact is most dominantly influenced by Ease of Understanding (□= 0.486, $p < 0.05$) and less so by Personalisation (□= 0.400, $p < 0.05$).

The combined composite SQ variable {Usability, Reliability} was found to be the strongest predicator of Intention to Transact (Adj. $R^2 = 0.431$ at $p < 0.05$). The relationships of the individual variables were also strong, {Usability} Adj. $R^2 = 0.323$ ($p < 0.05$), and {Reliability} Adj. $R^2 = 0.320$ ($p < 0.05$).

Multiple regression analyses taking Intention to Transact as dependent variable with the constructs of System Quality as independent variables indicate that Usability and Reliability are the most influential. The retention of both constructs results in a significant F value ($F = 17.223$, $p < 0.05$). The final model indicated Intention to Transact is most dominantly influenced by Reliability (□= 0.576, $p < 0.05$) and less so by Usability (□= 0.334, $p < 0.05$).

	Information Quality		System Quality
1	Ease of Understanding	1	Reliability
2	Personalisation	2	Usability
3	Security		
4	Relevance		
5	Completeness		

Table 5. Ranking of quality factors which influence Intention to Transact

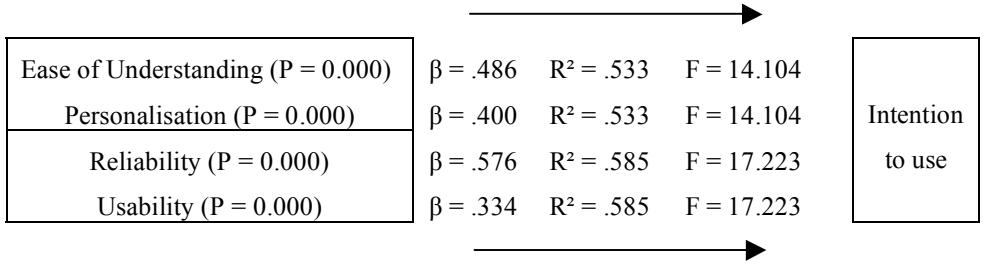

Figure 5. The influence of information quality on Intention to Transact

4.4 Hypotheses

Hypothesis	Result
H1 : Information Quality has a positive influence on Intention to Use	Accepted
H2 : Information Quality has a positive influence on User Satisfaction	Accepted
H3 : Information Quality has a positive influence on Intention to Transact	Accepted

H4 : System Quality has a positive influence on Intention to Use	Accepted
H5 : System Quality has a positive influence on User Satisfaction	Accepted
H6 : System Quality has a positive influence on Intention to Transact	Accepted

Table 6. Hypotheses testing - The influence of quality on success

5 DISCUSSION

5.1 The DeLone and McLean Model of Success in an E-Commerce Context

This paper provides one of the first e-commerce applications of the updated IS success model proposed by DeLone and McLean (2003) and clarifies the existence of relationships between factors of quality proposed in the revised D&M model and further establishes which factors are most influential in success as defined through the model.

This study supports the contention that there is no single success variable, (DeLone and McLean, 1992 at p.80) and shows there is a complex interplay of variables to be understood when seeking to measure online success. DeLone and McLean (1992) suggested that use and user satisfaction were singularly and jointly affected by system quality (SQ) and information quality (IQ). This statement is supported by this research. This paper reports the factors of SQ and IQ which influence Intention to Use, User Satisfaction and Intention to Transact and also their relative influence.

The 1992 study by DeLone and McLean highlighted the interdependency that exists among the constructs of IS success. This was further relayed in the 2003 updated model suggesting careful attention be paid to the "multidimensional and interdependent nature of IS success" (DeLone and McLean, 1003 at p. 11). This study supports this theory by providing empirical evidence of the interdependency of constructs. Specifically this study highlights the fact that some variables obtain extra influence when combined with other influential variables. Indeed the influence of some independent variables is accentuated only in the presence of others. This influence is stronger than either of the two variables individually. This presents difficulty in interpretation in isolating dependant variables. The strong Cronbach alpha measures however suggest that the multidimensional nature of this study was the correct approach and indicates that the measurement of e-commerce success should accommodate this multidimensional nature.

5.2 Intention to Use

The research found that of the Information Quality factors, Personalisation has the strongest influence on Intention to Use. The respondents who ranked the system highly for Personalisation indicated an intention to return to the site. This implies that increased awareness by the target market of Personalisation features in an online system will increase the number of visitors returning to the system or customer loyalty.

The research found that of the System Quality factors, Usability has the strongest influence on Intention to Use, implying that increased Usability of an online system will increase the numbers of visitors returning to the system or customer loyalty. This research confirms the importance of usability in the success of e-commerce systems. It also confirms Seddon and Kiew's (1994) argument that ease of use is a central part of system quality.

5.3 User Satisfaction

The factors that were found to be most influential on User Satisfaction were also the factors that are most influential on Intention to Transact {Ease of Understanding, Personalisation}. The implication is that a satisfied user will have a higher Intention to Transact. As the conversion of a site visitor into a purchaser is a goal of e-commerce systems (Berthon, Pitt and Prendergast, 1997) this research confirms the importance of User Satisfaction's inter-relatedness with Intention to Transact.

The requirement of a system to be personalised usually entails the creation of accounts (Huizingh, 2000). This research positively supports the creation of user accounts as an indicator of e-commerce success. The creation of user accounts allows for greater information capturing capabilities (Hagel and Armstrong 1997, at p.143) which, in turn, allows for the information served to be further personalised and easier for the registered user to understand. This logic is supported by the synergistic relationship seen between Ease of understanding and Personalisation in this research. The more personalised the information served, the easier it is understood and the further satisfied the customer will be.

5.4 Intention to Transact

The strongest relationships found by this research were the independent variables' relationships with Intention to Transact. Considering the relatively low-level of confidence in transacting using the Internet, shown by the sample in the pre-task questionnaire, this would suggest that that Intention to Transact is the most contentious of the three success variables. The emergence of Ease of understanding as the most influential factor in determining Intention to Transact is not surprising. Where the information describing the offering is easy to understand and personalised, the higher the intention to transact.

The security construct was found to be influential in determining Intention to Transact but was removed from regression analysis models. This suggests that security is of lesser importance in determining Intention to Transact than the other factors used in this research. This would imply that security is necessary but not sufficient for an Intention to Transact to be conducted. This result is interesting given the low-level of confidence in transacting exhibited by the sample. One would have expected that security would have been of prime importance to such a sample; however it appears that security is more of a contributory factor to Intention to Transact rather than a dependent one. A precise explanation of this result would require further data collection, however it may be speculated that security was regarded as an *a priori* feature of e-commerce transactions by the sample and hence taken for granted. Alternatively, the strong association of the sample for high levels of personalisation may have connoted a certain level of comfort in the process of transacting and as a result encouraged the development of a sense of security in the process.

This research does confirm that inadequate security adversely affects the development of e-commerce (Molla and Licker, 2001). This logic may be extended to the other factors of Information Quality which produced high adjusted R^2 figures but did not remain in the final model developed through regression analyses. Thus while content intended to boost transactions must, of necessity, be relevant and complete it must also be personalised and easy to understand to have an acute influence. In this case the interplay of variables creates an interesting level of complexity in affecting success measures.

Ranganathan and Ganapathy's (2002) research found that security was the best predicator of transactional intent. In their exploratory study, the provision of modes of transmitting transactional data and the provision for individual accounts with password and log-in for consumers was thought to influence security's importance in attracting more custom. In this research however, security was found to be of significant importance but was not found to be the most influential. The strong influence of Personalisation manifested as user accounts is confirmed by this research but further study may be required to understand the interdependencies between Personalisation and Security.

The factors that were found to be most influential from a System Quality perspective were Reliability and Usability respectively. The relative strength of Reliability over Usability has implications for developers especially in the balance between a reliable system and one that is not over-burdensome on the user. Trading the functionalities of a system against each other has been accepted as necessary in practice (van Iwaarden et al., 2004). This research indicates that where there is a decision to be made between the reliability of the system and usability, the features that increase Reliability at the expense of Usability may be preferred. This research confirms the importance of speedy recovery from errors (Liu and Arnett, 2000) in online transactional systems. This is of particular interest to the design of transactional pages online. Reliability has importance to the contract undertaken, order fulfilment and billing as well as a professional reputation online. However, ensuring the order is accurate and reliable, may reduce usability in ensuring the user has selected what they wish or ensuring fraudulent details are refused. This study supports such practices as using order confirmation screens seeking a final approval at the expense of adding an extra few clicks to the process.

5.5 Conclusions and Further Research

Quality is a critical area for commercial enterprise. In terms of e-commerce success, businesses need to understand the impact usability has on potential customers, the satisfaction users experience with various aspects of the web site and crucially, what factors will influence users to transact on their web site. This study has found significant relationships between constructs representing information and system quality and success constructs measuring Intention to Use, User Satisfaction and Intention to Transact. Generally, this study found the following information and system quality constructs to be most important: ease of understanding, personalisation and reliability.

It can be concluded that the D&M IS success model (2003) for studying Information Systems success is equally useful in measuring the relative success of e-commerce systems. However, our sample is relatively small and there is a need to conduct further tests in other areas of e-commerce interaction.

This paper also proposes further research to confirm the specific findings of this research and to explore the interdependency of the factors of quality and success. Further studies should be developed to explore correlations between the quality factors to further understand the interplay between the constructs in their influence on Intention to Use, User Satisfaction and Intention to Transact.

References

Aladwani, Adel M. and Prashant C. Palvia, (2002), "Developing and validating an instrument for measuring user-perceived web quality", Information & Management, Vol. 39, No. 6, May 2002, pp. 467-476.

Berthon, Pierre; Leyland Pitt; Gerard Prendergast, (1997), "Visits, hits, caching and counting on the World Wide Web: old wine in new bottles?", Internet Research: Electronic Networking Applications and Policy, Vol. 7, No. 1, pp. 5 – 8.

Chin, J.P., Norman, K.L., and Diehl, V.A. (1988), "Development of a tool measuring user satisfaction of the human-computer interface", ACM SIGCHI 88, pp. 213-218.

DeLone, W. and McLean, E., (1992), "Information Systems Success: The quest for the dependent variable", Information Systems Research, Vol. 3, No. 1, March 1992, pp. 60-95.

DeLone, W. and McLean, E., (2003), "The DeLone and McLean model of Information Systems Success: A Ten-Year Update", Journal of Management Information Systems, Vol. 19, No. 4, Spring 2003, pp. 9-30.

Gill, John and Johnson, Phil, (2002), Research Methods for Managers, 3rd edition, Paul Chapman Publishing Ltd., ISBN: 0-7619-4002-2.

Golden, W., M. Hughes and P. Gallagher, (2003), "Online Retailing: What drives success? Evidence from Ireland", Journal of End User Computing, Vol. 15, No. 3, pp. 32-44.

Hagel, John and Arthur G. Armstrong, (1997), "Net Gain: Expanding Markets through virtual communities", The McKinsey Quarterly, No. 1, pp. 141-153.
Hasan, H., Tibbits, HR, (2000), "Strategic management of Electronic Commerce: An adaptation of the balanced scorecard", Internet Research, Vol. 10, No. 5, pp. 439-450.
Huizingh, Eelko K.R.E., (2000), "The content and design of web sites: an empirical study", Information & Management, Vol. 37, No. 3, April 2000, pp. 123-134.
Lee, Yang W.; Strong, Diane M.; Kahn, Beverly K.; Wang, Richard Y., (2002) "AIMQ: methodology for information quality assessment", Information & Management, Vol. 40, pp. 133-146.
Liu, Chang and Arnett, Kirk P., (2000), "Exploring the factors associated with Web site success in the context of electronic commerce", Information & Management, Vol. 38, No. 1, October 2000, pp. 23-33.
Molla, A., and Licker, P.S., (2001), "E-commerce systems success: An attempt to extend and re-specify the DeLone and McLean model of IS success", Journal of Electronic Commerce Success, Vol. 2, No. 4, pp. 1-11.
Negasha, Solomon; Ryan, Terry; Igbaria, Magid, (2003), "Quality and effectiveness in Web-based customer support systems", Information & Management, Vol. 40, pp. 757-768.
Seddon, Peter B., (1997), "A respecification and extension of the DeLone and McLean model of IS success", Information Systems Research, Vol. 8, No. 3, pp. 240-253.
Seddon, Peter B. and Min-Yen Kiew, (1994), "A Partial Test and Development of the DeLone and McLean Model of IS Success", Proc. Internat. Conf. Inform. Systems, Vancouver, British Columbia, Canada, December 1994, pp. 99-110.
Taylor, Shirley; Todd, Peter A., (1995), "Understanding Information Technology Usage: A Test of Competing Models", Information Systems Research, Vol. 6, No. 2, June 1995, pp. 144-177.
van Iwaarden, Jos; Ton van der Wiele, Leslie Ball and Robert Millen, (2004), "Perceptions about the quality of web sites: a survey amongst students at North-eastern University and Erasmus University", Information & Management, Vol. 41, No. 8, November 2004, pp. 947-959.
Webb, B., and Sayer, R., (1998), "Benchmarking small companies on the Internet", Long Range Planning, Vol. 31, No. 6, pp. 815-827.
Zhang, Xiaoni; Keeling, Kellie B.; Pavur, Robert J., (2000), "Information Quality of Commercial Web Site Home Pages: An Explorative Analysis", Proceedings of the Int'l Conf. of Information Systems, Brisbane, Australia (2000), pp. 164-175.