E-COMMERCE SYSTEMS SUCCESS: AN ATTEMPT TO EXTEND AND RESPECIFY THE DELONE AND MACLEAN MODEL OF IS SUCCESS

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ABSTRACT

E-commerce success is an issue that has attracted the interest of many pundits. There is a general scarcity of models and frameworks for evaluating e-commerce success. Whether traditional information systems success models can be extended to investigating e-commerce success is yet to be investigated. This paper proposes a partial extension and respecification of the Delone and Maclean model of IS success to e-commerce systems. Customer E-commerce Satisfaction (CES) is proposed as a dependent variable to e-commerce success and its relationships with e-commerce system quality, content quality, use, trust and support are defined and discussed. Further research into developing, validating and empirically testing the model is proposed.

Keywords: E-commerce, E-commerce systems success, Customer e-commerce satisfaction, Delone and Maclean

1. Introduction

Both the popular and academic literatures promise many benefits to be derived from e-commerce systems. Some of these include expanding firms' "reach" without compromising "richness" (Evans and Wurster, 2000); gaining competitive advantage (Schuete, 2000; Warrington et al, 2000) and reducing market, administrative and operational costs (Chappell and Feindt, 1999; Coppel, 2000). However, such claims are not widely supported by empirical data. In fact, some preliminary studies (see for example Marshall et al, 2000; NNI, 1999) indicate a wide gap between anticipated and actual achievements from e-commerce systems. This has motivated a number of studies to look for factors that inhibit or facilitate e-commerce success (see for example Han and Noh, 1999, Turban and Gehrke, 2000). Findings are neither satisfactory nor conclusive. In addition, there appears to be a lack of e-commerce success model(s) to guide and inform studies in this area. Neither the dependent nor independent variables are yet defined.

At the beginning of 2000, Benbasat, Ives and Piccoli conducted a survey of the ISWorld Community on the "*Electronic Commerce Top Research Questions"*. The result of that survey indicates e-commerce success as one of the important electronic commerce research issues. Whether traditional information systems (IS) success models can be extended to e–commerce success, the extension of the "quest for the dependent variable" to e-commerce systems and the measurement of e-commerce success in an organization are some of the research questions identified in that survey. This paper takes these questions on board and proposes an extension of the Delone and Maclean (1992) model of IS success to e-commerce success.

2. The Many Faces of E-commerce

The practice of electronic commerce (e-commerce) has been in existence since 1965 when consumers were able to withdraw money from Automatic Teller Machines (ATMs) and make purchases using point of sale terminals and credit cards. This was followed by systems that crossed organizational boundaries and enable organizations to exchange information and conduct business electronically. Such systems were commonly known as interorganizational systems (Senn, 2000).

Until the widespread deployment of Internet-based technologies in the early 1990s, enterprises that conducted e-commerce used almost exclusively a closed and standardized form of computer-to-computer communication known as "electronic data interchange" (EDI). In fact, the term "electronic commerce" was virtually synonymous with "EDI" (Fellenstein and Wood, 2000; Senn, 2000). E-commerce as such, however, has come to attract the

interest of many following the commercialization of the Internet and especially the advancement of the World Wide Web and its business applications. Hence, in the evolution of e-commerce, it is possible to differentiate between traditional e-commerce and Internet based e-commerce.

E-commerce today means many things to different people. There exists a wide variety of e-commerce definitions and conceptualizations covering a plethora of issues, applications, and business models. Some view e-commerce as *"doing business electronically"* (see for example EC, 1998). Such definition tends to be very generic and specify neither the network archetypes nor the business activities to be conducted electronically. Other definitions (such as OECD, 1999), when referring to e-commerce, specifically emphasize the Internet and other similar TCP/IP based networks that use non-proprietary protocols as a conduit for conducting business electronically.

Academic definitions are narrower and focused on applications and business supports. Zwass (1996), for example, defines e-commerce as "*the sharing of business information, maintaining business relationships and conducting business transactions by means of telecommunications networks*". Others (Applegate, 1999, Fellenstein and Wood, 2000) also support this view and consider e-commerce to include various processes within and outside the organization in addition to buying and selling activities.

Various attempts have been made to develop frameworks and to explain the differences in the e-commerce views of existing research. In one of the earliest works, Zwass (1996) suggests that the best way to conceptualize and analyze e-commerce is to consider it as a hierarchical structure composed of three metalevels: *infrastructure, services and products and structure*. Zwass indicates that each of these levels provides a unique way of abstraction in that lower ones deliver a well-defined functional support to the higher ones. Riggins and Rhee (1998) on the other hand suggest *the location of the application user relative to system firewall* (such as internal and external) *and the types of relationships* (technology enhanced and technology facilitated) as two dimensions along which e-commerce (internet based) views can be differentiated. By combining these two dimensions, Riggins and Rhee (1996) propose several uses of e-commerce ranging from externally focused e-commerce with the objective of facilitating new or enhancing existing business relationships (such as business to consumer and business to business) to intraorganizational systems with the purpose of improving coordination with internal business.

Based on the previous discussion, in any definition of e-commerce, it is important to identify four basic dimensions: the nature of the network archetype, the application solutions, the business functions performed or supported and the parties involved in the electronic relationships. Figure 1 provides a diagrammatic representation of this framework.

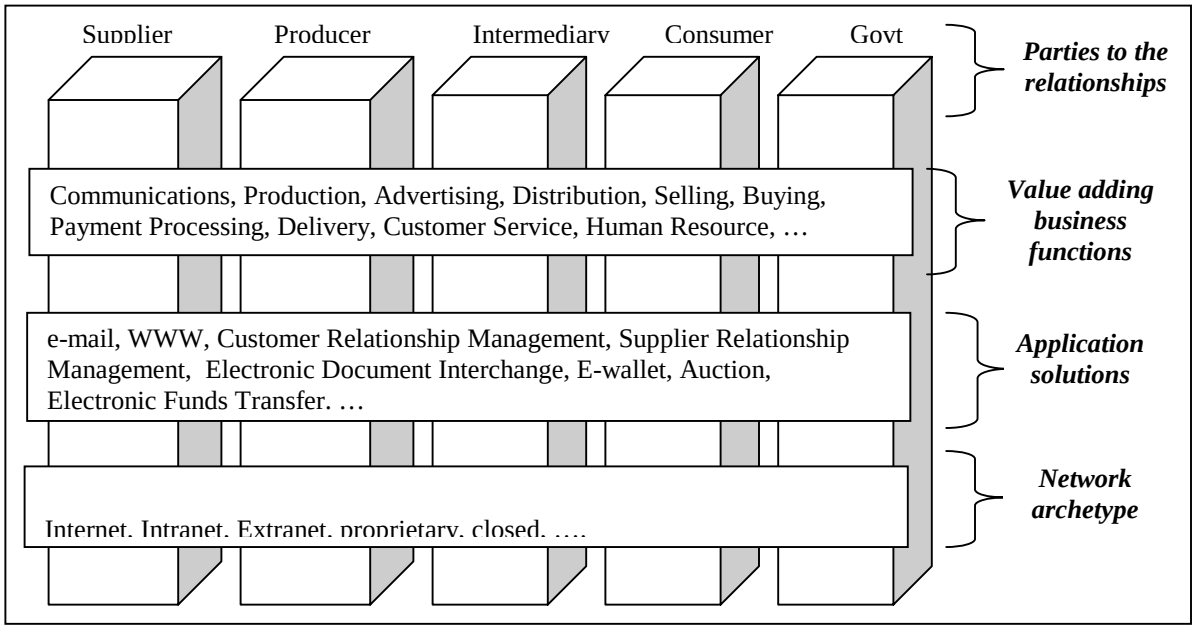

Figure 1: A framework for classifying e-commerce views

Using the framework in figure 1, this paper focuses on e-commerce systems that are Internet based and that use World Wide Web based application solutions in order to perform one or more of the business functions -- such as

information provision, communication, buying, selling, distribution, customer service, delivery, and payment processing among producers, suppliers and their customers. The business models that underlie e-commerce systems determine the nature of the product or service offering, the actors and role players (or parties to the relationship) and the revenue stream. For example, the most common and popularized use of e-commerce is to replace or enhance traditional market channels by opening Web-based storefronts. In this type of e-commerce, also commonly referred to as "Business to Consumer e-commerce", organizations offer their products and services and generate revenue from the actual sale of those products and services to their customers. In another e-commerce model, businesses attract visitors to their Websites by hosting comprehensive information of interest to customers and generate their revenue from other businesses that follow visitor eyeballs and advertise their products and services on such Websites.

While the provision of information, even if the information is not necessarily targeted to organizational employees (as is the case in the traditional information systems), remains the core of any e-commerce system, e-commerce systems additionally serve transactional and customer service purposes (Young and Benamati, 2000) and allow the on-line conduct of the three phases of marketing: pre-sale, on-line sale and after-sale (Schubert and Selz, 2001) . Using e-commerce systems, organizations still deliver information about their products and services, their operation, their history, vision, structure, policy and job opportunities to their employees, members of the value chain, shareholders, regulators, academics, industry pundits or any interested visitor. But e-commerce systems have revolutionized the way organizations provide such information. Users can now specify what information is to be presented, in what order or arrangement, using which colors and so on.

In addition to capturing, processing and presenting information to support customer and business decision-making, e-commerce systems enable organizations to market their products and services online and provide a range of services that customers themselves can perform without direct human assistance. Customers and businesses can use such systems to negotiate terms and prices (when and if price is dynamic), place and accept orders, track order and delivery status, make and receive payments, access and update accounts, and ask and provide product and service supports. Moreover, using e-commerce systems, organizations can empower their customers to do many things that were formerly impossible, at the customers' convenience. The self-service enabled by e-commerce allows customers to conduct a wide range of activities such as changing address, securing a credit card or loan, learning from other customers, personalizing a service agreement and adding new products or services to their list of interests or purchases without human assistance.

Therefore, while an e-commerce system can be considered as a kind of information system -- thus providing the justification for the application of information systems (IS) theories -- the additional uses listed above distinguish them from traditional information systems. Hence, any effort to extend IS success models and measures to e-commerce systems needs to consider the additional business functions that can be performed using e-commerce systems as opposed to information systems. Information systems success models can be enhanced because of our specific knowledge of the kinds of users and their goals and their activities. These models can be extended because of the particular relationships e-commerce systems have with their environments and organizational contexts.

3. Information Systems Success

Despite the large number of empirical studies in IS success, what exactly is meant by "IS success" has never been clear nor research found much agreement (Garrity and Sanders, 1998). It appears that IS success is one of the controversial issues that has eluded IS researchers. The problem is compounded because *success* is a multidimensional concept that can be assessed at different levels (such as technical, individual, group, organizational) and using a number of not necessarily complementary criteria (such as economic, financial, behavioral and perceptual).

However, many authors in the field regard Delone and Maclean's work as a major breakthrough. Delone and Maclean (henceforth, "D&M"), after a comprehensive review of various measures used in the literature to assess IS success, propose a model that incorporates several individual dimensions of success into an overall model of IS success (see figure 2).

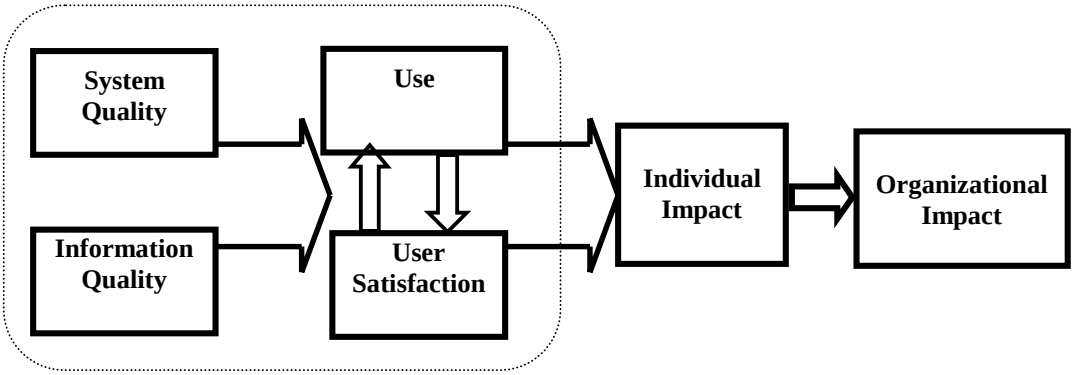

Figure 2: Delone and Mclean's Model of IS Success
Source: (Delone and Maclean, 1992: 87)

The model is to be interpreted in the following ways:

> SYSTEMS QUALITY and INFORMATION QUALITY singularly and jointly affect both USE and USER SATISFACTION. Additionally, the amount of USE can affect the degree of USER SATISFACTION – positively or negatively -- as well as the reverse being true. USE and USER SATISFACTION are direct antecedents of INDIVIDUAL IMPACT; and lastly this impact on individual performance should eventually have some ORGANIZATIONAL IMPACT (Delone and Maclean, 1992: 83-87).

D&M's model of IS success has informed a number of subsequent studies (see Saarinen, 1996; Seddon and Kiew, 1996; Grover et al, 1996; Garrity and Sanders, 1998). However, it also has its own share of opponents. Some of the strongest criticisms include mixing variance and process models in one package (Seddon, 1997); misrepresentation of the Shannon's model of communication; blurred theoretical underpinning; and the unreality of the unidirectional relationship among use, user satisfaction, individual impact and organizational impact (see Garrity and Sanders, 1998).

Despite such caveats, it is possible to look into the D&M model from two angles. For the lack of a better term and for the sake of analysis we will refer to these as the *left hand* and *right hand* sides of the model. The left hand side (the dotted box in Figure 2) of the model establishes the relationships among *System Quality*, *Information Quality*, *Use* and *User Satisfaction.* The model has done a great service in indicating the interdependencies among the different variables of IS success measures. In a subsequent study, Seddon and Kiew (1996) have produced empirical evidence to support the relationships assumed on the left hand side of D&M's model. In addition, the left hand side of the model defines the antecedents to the two of the most widely used criteria of IS success, that is *Use* and *User Satisfaction*, and organizes the different independent variables that affect user satisfaction.

However, the part (right-hand side) of the model, which assumes linear causality between *User Satisfaction*, *Individual Impact* and *Organizational Impact*, is not as strong and informative as the left-hand side. Organizational and technological discontinuities and the existence of exogenous factors operating between the different levels militate against such linearity assumptions. As a result, a system which is successful by *User Satisfaction* measures may not necessarily result in positive individual performance or favorable organizational outcomes.

4. E-Commerce Success Model

A growing number of studies are discussing e-commerce success. Using the D&M model and the communication and ecology theories that anchor the model, there is a need to evaluate the success of e-commerce systems at different levels -- *system, individual and organizational*. Likewise, some e-commerce researchers (such as Von Dran et al, 1999; Kim, 1999; Loiacono and Taylor, 1999) have focused on the system aspects of e-commerce systems that establish the web presence of companies. Others (see Zhang et al, 2000) investigated the quality of the content displayed on the web system as distinct from the technical quality of the system. A growing number of studies (Henneman, 1999; Nielsen, 1999) are also focusing on the usability aspect of e-commerce systems while others (Han and Noh, 1999, Jones & Kayworth, 1999) focus on assessing the use level and the satisfaction of users and customers in interacting with e-commerce systems. A few studies (Schubert and Selz, 2001, Kardaras and Karakostas, 1999) have investigated the overall effectiveness of e-commerce systems and its impact on organizational performance.

While each of the studies mentioned above made significant contributions, little attention has been paid to integrating the various independent variables into a comprehensive model and in defining the dependent variable. Although *Use and User Satisfaction* are the most widely used dependent variables in the e-commerce literature, standard and systematic criteria for assessing *Use* and *User Satisfaction* of e-commerce systems do not seem to appear. For example, existing *Use* metrics focus on using specialized software to calculate indices such as reach, hit, click-through rate, conversion rate and do not extend to identifying what really affects *Use.* In the same vein, there does not appear to be a comprehensive framework and/or model that integrate the various independent variables into *User Satisfaction*. In addition, despite the number of emerging studies (Lam and Lee, 1999; Chen and Wells, 1999; Kim 1999; Jahng et al, 1999; Meuter et al, 2000) that identify factors that affect customer satisfaction in e-commerce, there is no comprehensive framework and/or model that integrate the various independent variables suggested by the studies to the satisfaction of the major group of users namely customers.

The substitution of *customer satisfaction* for *user satisfaction* as a dependent variable to e-commerce success warrants further discussion. Using *customer satisfaction* as a dependent variable might overcome the theoretical difficulty of the relationship of user satisfaction to organizational performance. However, it might also introduce some conceptual and operational complexities.

Businesses depend on their customers. In fact, customers are the very livelihood of business organizations. Customer satisfaction has always been assumed as a necessary condition for the success of organizations. There are several studies (see for a summary Andre and Saraiva, 2000) that bring to evidence the benefits that derive from a high level of customer satisfaction, namely through increase of customer loyalty, reduction of price elasticity, decrease of failure-related costs, easier acquisition of new customers, increase of the products portfolio supplied to customers, brand's and enterprise's prestige in the market and so forth. In addition, evidence abounds from management, organization and marketing literature that customer satisfaction is positively related to increased profitability, larger market share, and growth (Naumann 2001, Meuter et al, 2000; McColl-Kennedy and Schneider, 2000). Hence, the substitution of user satisfaction with customer satisfaction as a dependent variable in e-commerce success overcomes the not so obvious and often questionable link in the D&M model between user satisfaction and organizational performance.

Customer satisfaction, however, is a much broader and more complex concept as can be evidenced through the various national customer satisfaction indexes (such as the American Customer Satisfaction Index (ACSI), Swedish Customer Satisfaction Barometer (SCSB), the European Customer Satisfaction Index (ECSI)) and the wide range of industry-specific models suggested in the marketing and management literature (for an overview see Bearden et al, 1996; Hayes 1992). While some models of customer satisfaction focus on the service delivery aspect, others incorporate issues related to features of tangible products such as durability, reliability, structural design and so on. For example, one of the more widely used instruments for assessing customer satisfaction is SERVQUAL developed by Zeithaml et al (1990). SERVQUAL entails measuring the gaps between the perceptions of customers, the level of service provided and the potential of improvement. Naumann (1995) on the other hand proposes another model and instrument of customer satisfaction that incorporates attributes related to product quality, product design and value. Other models (McColl-kennedy & Schneider, 2000) investigate influence factors such as social, self-concept, and perceived alternatives on customer satisfaction.

Although extensive academic research can be found in management, organizational and marketing literatures on customer satisfaction, the focus of such research has been on the dynamics of interpersonal interaction between service providers and customers and the value of core products and services (Meuter et al, 2000). Much less research has investigated customers' interactions with e-commerce systems. E-commerce systems however significantly reduce the interpersonal encounter that forms the core of most customer satisfaction research. On the other hand, the very few studies that investigated e-commerce customer satisfaction as a surrogate measure to e-commerce success lack comprehensiveness in capturing the full functionality of e-commerce systems. Therefore, the concept of customer satisfaction as applied to e-commerce systems success needs to be carefully defined in order to make the suggested model tractable. In general, existing works related to User Information Satisfaction, Customer Satisfaction and SERVQUAL and the few attempts that use customer satisfaction as a surrogate measure for e-commerce success are limited in scope and treatment to describe e-commerce success and there is a gap in the existing research for a comprehensive e-commerce success model.

The focus of this paper is hence to use the theoretical legs of the D&M model and propose an extended and comprehensive e-commerce success model that spans all the phases of on-line transaction and all the purposes of e-commerce systems. The D&M model is used here because of the relevance of the theorization that goes behind it to e-commerce systems and its potential to allow systematic organization of the various criteria of success in a meaningful way. Effort is made to retain as much as possible the richness of the D&M model while at the same time allowing ways to capture the peculiar nature of e-commerce systems. The additional knowledge of the specific tasks

e-commerce users (i.e., customers) are engaged in leads us to refine the D&M model to reflect the marketing phases (pre, during and after sale) and e-commerce purposes (information, transaction and customer service). Figure 3 provides the resulting e-commerce success model.

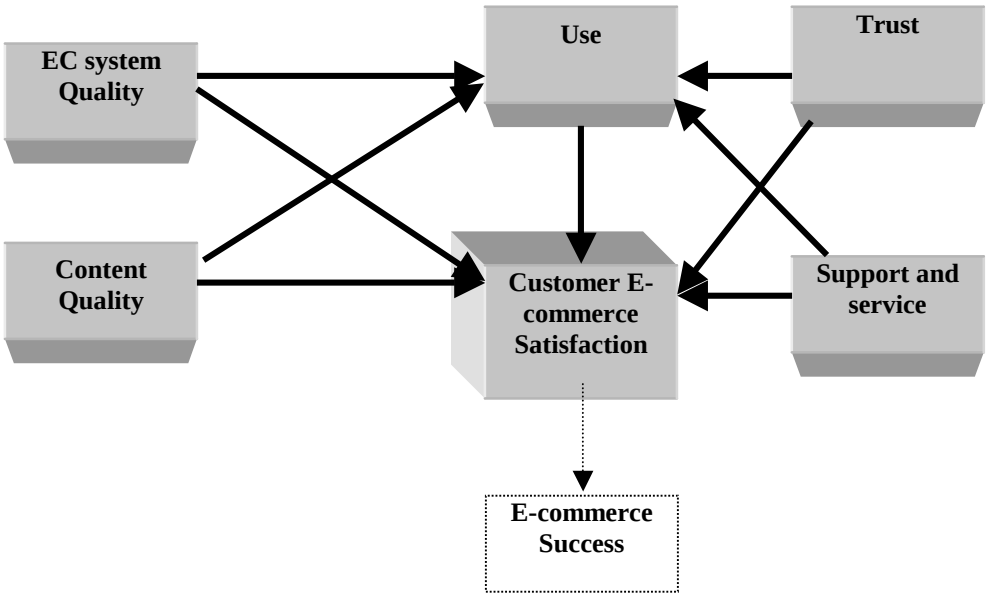

Figure 3: E-commerce Success Model

The main differences between the D&M model and the extension proposed here are:

- The *System* and *Information Quality* components in the D&M model are replaced by *E-commerce System* and *Content Quality* respectively. E-commerce systems and content require additional constructs that are not captured by the traditional system quality and information quality measurements (more on this later).
- *User Satisfaction* is replaced with *Customer E-commerce Satisfaction*. As previously mentioned, e-commerce users are specific types of users and the knowledge we have of their goals and tasks simplifies and refines our attempts to conceptualize and measure their satisfaction. The criterion of user satisfaction as postulated in the IS success literature is limited in scope to the aspects of the information product and services from the IT function. The concept of customer satisfaction as discussed in management and marketing literature is broad and involves a number of issues outside the scope of e-commerce systems. But *customer e-commerce satisfaction* is proposed here as a dependent variable to e-commerce success (more on this later)
- Because e-commerce systems users are not mostly members of the organization purveying the system, and do not necessarily share its goals, two additional factors – *trust* and *service* are needed to capture the transactional and customer support components of e-commerce systems and understand the relationship between use and customer e-commerce satisfaction
- While most studies that follow D&M replace the *Use* box with *Usefulness* because of the ambiguity of the criteria when *Use* is mandatory and when it is not, we prefer to maintain *Use* as in the original work. In e-commerce systems *Use* is largely voluntary and even when not (such as the existence of one source or outlet), users need not use the system and can simply refuse to buy. However, mere *Use* as reported by hit counters should be interpreted with caution. Specifically, in transactional-based e-commerce systems such measures may not indicate any type of e-commerce performance.

Following is a brief description of each of the variables in the above model.

4.1. Customer E-commerce Satisfaction

Customer e-commerce satisfaction (CES) is the dependent variable in the extended and respecified model. With the proliferation of e-commerce and e-commerce related services, interpersonal service encounters are giving way to self-service e-commerce systems that reduce the need for direct and intensive human interaction. Moreover, customers interact with e-commerce systems not for the mere purpose of extracting information but also to conduct a number of activities. This conveys the need for extending the customer and user satisfaction research into the e-commerce context beyond the interpersonal dynamics of service encounter and the informational purpose respectively.

Depending on the nature of the e-commerce model underlying the system, the product offering and the purpose of the e-commerce system, it is possible to differentiate between two main facets of customer e-commerce satisfaction- (1) satisfaction with the core product and service and (2) satisfaction with the process and system used to deliver the core product and service. Whereas such distinctions are easy to detect and investigate when organizations are marketing tangible products such as books, CDs, home appliances and so on, the distinction is blurred for services such as on-line banking, content aggregators, electronic stock market. For example, retailers operating along an Amazon.com type of model (that is, using e-commerce systems as channels for selling products that they themselves do not produce) may have no or little influence over the actual quality of the products they are marketing. Their customers' e-commerce satisfaction is mainly dependent on the customers' experience and expectations in using the e-commerce system. The fact that a customer is dissatisfied by the quality of a home appliance purchased through Amazon may have nothing or little to do with his/her satisfaction of the processes and systems Amazon put in place in order to market such products and with his/her decision to stay loyal to Amazon. But for service-related e-commerce models and offerings that are provided in digitized format, the core product is highly intertwined with the system used to deliver the product thus making it difficult to differentiate the two experiences. The system in some sense is the product and system use is the service. Hence, the satisfaction or dissatisfaction with one may easily affect the other.

Based on the definition of e-commerce within which this paper works, the concept of customer e-commerce satisfaction (CES) adopted here therefore corresponds to the evaluation of the reaction or feeling of a customer in relation to his/her experience with all aspects of an e-commerce system (such as informational, transactional and service and support) put in place by an organization to market (pre, during and after sale) its products and services. The concept, however, does not include attributes related to the quality of the physical product as captured in most customer satisfaction models. Defined in such a way, CES can serve as a dependent variable in investigating e-commerce success and is affected by (following the D&M model) *e-commerce system quality, content quality, use, trust and the extent of support provided.*

4.2. E-commerce System Quality

Seamless site performance is an important consideration in e-commerce. While many researchers investigating e-commerce make various suggestions as to the quality of e-commerce sites, defining e-commerce system quality has proven to be a difficult task. Based on the model proposed here (Figure 3) the *E-commerce System Quality* can be differentiated from the *Content Quality.* Earlier MIS works investigated *reliability of the system, system accuracy, flexibility, online response time and ease of use* as part of the *system quality* dimension (See Delone and Maclean, 1992). These criteria are equally applicable to e-commerce systems. Recent works (Turban and Gherke, 2000, Han and Noh, 1999) that focus on e-commerce have however suggested additional variables such as 24-hour availability, stability of software and hardware, page loading speed, the system architecture, visual appearance and accessibility as part of the e-commerce system quality. The model highlights that such attributes of e-commerce sites are likely to influence the *Use* and *Customer Satisfaction* of e-commerce systems. In e-commerce, potential competitors are only one mouse-click away and site failure results in customer dissatisfaction and non-use of e-commerce systems. For transactional e-commerce systems, this means loss of sales. For example, some studies purport that failing sites are losing as much as 40 percent of "repeat end-user traffic" (Fellenstein and Wood, 2000).

4.3. Content Quality

While information has long been considered as an important asset to modern business, e-commerce has elevated content, i.e., the information, data, experience or knowledge to higher levels of significance. In addition, for some e-commerce business models (such as content aggregation and infomediation) content forms their core business, i.e., their product. In e-commerce, content is a source of value and containers (products, services, transactions, etc) without content are simply valueless (Hartman et al, 2000). Some researchers have focused on the quality of the content, rather than measuring the quality of the web system. *Content quality* refers to the characteristics and presentation of information in the e-commerce system (Zhang et al 2000, Von Dran et al, 1999).

Content characteristics include attributes of the content that is presented on the e-commerce site. The information systems literature has unequivocally underscored the importance of information quality as one of the determinants of user satisfaction and their intention to use a particular system and identified a number of attributes such as accuracy, up-to-datedness, comprehensiveness, understandability, completeness, timeliness, reliability, relevancy, currency, preciseness. On the other hand, "content presentation" refers to the organization and presentation of the information content and to what extent a user controls (customizes) the content (Von Dran et al, 1999). This involves the amount of information presented on a single page, the need for scrolling down to see the full content of a page, logical structure of information within the website, the readability of the pages, website navigation technique and so on. The quality of the content and the extent to which that content meets the needs and expectations of customers might affect the success of the organization and determine whether a customer will stay

on the site or move to the next (one click away) site. Findings from Turban and Gehrke (2000) and Zhang et al (2000) indicate that *Content Quality* is one of the variables that affect the satisfaction of Web site users. Chen and Wells (1999) also found that the quality of the content was one of the determinants of positive customer attitudes towards Web sites.

4.4. Use

The *use* of e-commerce systems is one of the widely used criteria for assessing success. *Use* level as captured through "hits" and "visits" is often used to indicate the market share and reach of e-commerce pacemakers like Amazon and Yahoo. For many of the startup e-ventures, one of the primary challenges is to attract customers to their e-commerce site. It might thus actually make sense to consider *use* as an indicator of some sort of initial success. Moreover, considering the fact that the use of a particular e-commerce system by a customer is completely on a voluntary basis, *use* as a criterion of e-commerce success eliminates the problem of the non-voluntariness of *use* often associated with traditional information systems and opens the debate to considering *use* as a prime component of *success*.

Different types of use have been identified in the IS literature (see Delone and Maclean, 1992). Likewise, depending on the offering of e-commerce sites it is possible to identify different categories for the use of e-commerce systems. Considering the purposes of e-commerce systems suggested by Young and Benamati (2000), the use of e-commerce system could likewise be divided into informational, transactional or customer service. Informational use could further be divided into *general use* for routine information provided on e-commerce sites and *specific use* for special requests logged by customers. Moreover, some *uses* are followed by specific actions such as a customer updating his/her address, ordering a product while other *uses* do not result in any specific actions, at least not actions discernible to the user. For reasons described earlier in this paper, *e-commerce system use*, especially through existing measurements of use, has to be interpreted with caution. In addition, across time, previous experience with the site and customer support might affect future use of e-commerce systems.

4.5. Trust

Beside the *quality of the site and content* (attributes of e-commerce systems) *e-commerce use* and *satisfaction* could be affected by customers' disposition towards security and privacy issues. Real and/or perceived fears of divulging personal information and customers' feelings of insecurity provide unique challenges to e-commerce operators to find ways in which to initiate e-commerce relationships. Customers are concerned about the level of security present when providing sensitive information online (Warrington et al, 2000) and will use e-commerce only when they develop a certain level of trust (Ferraro, 1998). *Trust* refers to the two important issues that are identified across studies in affecting the future of e-commerce systems – **security and privacy.**

Security relates to the protection of information or systems from unsanctioned intrusions or outflows (Lobel, 1999). Fear of the lack of security is one of the factors that have been identified in most studies as affecting e-commerce growth and development. The extent to which e-commerce systems ensure that transactions are conducted without any breach of security is an important consideration that might affect e-commerce use and customers' e-commerce satisfaction (Han and Noh, 1999; NNI, 1999).

Privacy, on the other hand, refers to the ability of an individual to keep his/her identity confidential during the course of a transaction and the protection of various types of data that are collected (with or without the knowledge of customers) during customers' interaction with e-commerce systems. Privacy issues -- such as the amount of personal information required to complete transactions, the privacy policy and rules followed by e-commerce sites and customers' disposition towards the provision and disclosure of personal data – may affect the *Use* of e-commerce systems and *Customer Satisfaction* (Han and Noh 2000). In general, the trust that customers have in the system (and/or the party behind the system) to conclude their transaction securely and to maintain the privacy of their personal information affect their level of satisfaction and their voluntary use of e-commerce systems (Warrington et al, 2000).

4.6. Support

A question of value to e-commerce operators is whether their customers will return to their site after their initial experience, i.e., loyalty. Some factors, which influence customers' loyalty have to do with the support the operator is capable of providing the customer across the transaction lifecycle. Customers value highly the support and service the operator provides during all phases (pre, during and after-sale) of the transaction (Young and Benamati, 2000;). This support and service can take different forms and may include the following: site intelligence (the extent to which the e-commerce system remembers repeat users and aids them in achieving goals), relevant search facilities, feedback, calculators, currency converters, tracking order/shipment status, account maintenance, payment alternatives, FAQs, etc (Kardaras and Karakostas, 1999; Schubert and Selz, 2001). The multifaceted experiences of customers in pre-sale (such as searching for information on products and services), during- transaction and post-sale

activities and the e-commerce system's capability to support and guide the users in all these phases contribute to the customers' satisfaction.

5. Summary

E-commerce systems demonstrate similarities with traditional information systems while at the same time allowing additional functionality that cannot be performed on typical information systems as we came to understand information systems. The similarities between e-commerce systems and other information systems motivate researching the possibilities of extending IS theories to e-commerce. This paper makes one such effort in applying and extending D&M's IS success model to e-commerce success.

Success is a multidimensional construct and attempts to define it otherwise will be flawed both in concept and operation. In addition, success can be assessed at various levels such as system, individual and organizational. What to assess and how to measure it depend on the level of analysis and results from each levels of analysis may not necessarily show causality. That means, for example, that organizational level success may not necessarily follow the success of the system at the individual level.

In this paper, a proposal is made to apply and extend the D&M model to E-commerce success by defining an independent variable called Customer E-commerce Satisfaction (CES). The use of CES provides an appropriate proxy for assessing e-commerce success and extending the missing link to organizational performance, which was the subject of much criticism in the user satisfaction literature. In fact, some (see for example McColl-Kennedy and Schneider, 2000; Anderson and Fornell, 2000) argue that satisfied customers could be considered as assets ("customer capital") in themselves; should be acknowledged as such on the balance sheet and monitored just like physical assets. However, because e-commerce systems come in many shapes and organizations use different models to establish their e-commerce presence, CES has to be seen within the context of the functionality provided by the e-commerce system.

The e-commerce success model presented here is comprehensive and does not make distinctions among different facets of customer satisfaction. In practice, however, CES is a complex attitude and one might need to differentiate various facets of CES such as satisfaction with the content, satisfaction with the design characteristics of the e-commerce system, satisfaction with the service rendered through the e-commerce system and so on. This is highly important for practitioners as it can highlight areas where customer expectations are not being met and where organizations must work to excel customers' expectations and retain their loyalty. Moreover, to be of real practical value, CES should not be treated as a static, singular dependent variable that compares the extent to which individual expectations were fulfilled on the basis of a single assessment, but rather as an outcome of a continuous process of satisfaction formation and reformulation. This is essential because new e-commerce experiences and levels of customer awareness lead to new levels of expectation that will alter the levels of satisfaction achievable. That is, both individual users as well as surveyors of e-commerce systems (and indeed e-commerce as an industry) are enabling, mutating and establishing niches and standards daily. Hence, continuous assessments enable the identification of trends and the comparison of CES results for one point in time with what they were one or two years earlier. In addition, CES has to be seen cross-culturally. This is especially very important for companies that do businesses globally. For example does satisfaction mean the same thing for a South African customer as for an Ethiopian using the same website? Are they influenced by the same set of factors? Are the factors that drive repeat use of e-commerce systems in UK the same as in Egypt or America? What is the role of cultural differences in driving the e-commerce use behavior of customers?

Finally, further research is required to improve both the theoretical base and operational constructs of the model and develop a CES measuring instrument. The instrument to be developed should consider existing instruments such as UIS, Customer Satisfaction, SERVQUAL and WebQual.

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