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A proposed model to evaluate the benefits of government sponsored regional electronic marketplaces for SMEs: Extending the updated DeLone & McLean IS success model

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A Proposed Model to Evaluate the Benefits of Government-Sponsored Regional Electronic Marketplaces for SMEs: Extending the Updated DeLone & McLean IS Success Model

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Abstract

Despite a growing body of research on the benefits of Internet-based electronic marketplaces, few evaluation models have emerged to examine them. This paper proposes a conceptual model to evaluate the benefits of a government-sponsored regional e-marketplace for small and medium enterprises (SME-REM). The updated DeLone & McLean IS Success Model is extended using data from a literature review on e-marketplaces, SME participation in e-commerce and from an ongoing case study of a government-sponsored SME-REM in Western Australia. The extended model considers a longitudinal approach and the context of the evaluation in determining the net benefits of government-sponsored SME-REMs.

Keywords

E-Commerce, Regional Electronic Marketplaces, SMEs, Evaluation of Benefits

INTRODUCTION

Internet-based e-marketplaces continue to receive the attention of both the business and academic communities as market makers, participants, governments and academia alike strive to understand how best these inter-organisational information systems can be used to leverage the benefits of the digital economy. While there are many studies that deal with the benefits of e-marketplaces and the factors critical to their success (Bakos, 1998; Braun, 2002; Brunn, Jensen, & Skovgaard, 2002; Le, 2002; Lucking-Reiley & Spulber, 2000; Raish, 2001), there have been few attempts to develop evaluation models with a holistic view of the benefits of e-marketplaces for all stakeholders. This is partly due to the fact that e-marketplace models are themselves evolving and while there are benefits that are common to all types of e-marketplaces, there are some benefits that can be differentiated on the basis of e-marketplace structure and ownership models.

Is there a need, therefore, to develop an e-marketplace success model at this stage? Can existing IS success models be used to evaluate the benefits that e-marketplaces offer? While existing IS success models like the Updated DeLone & McLean IS Success Model (DeLone & McLean, 2003) (hereafter referred to as the Updated D&M IS Success Model) can be used to measure the success of both organisational and inter-organisational, e-commerce and non e-commerce information systems, one factor that predicates the urgent need for a more holistic evaluation framework for e-marketplaces is the growing number of government-owned or sponsored e-marketplaces for SMEs that are being considered and established (www.go4gain.com.uk, www.mysouthwest.com.au, www.sba.gov/sbaexchange/). This growth has been fuelled by the increasingly popular view that while the Internet and e-commerce is a way for SMEs to access global markets by overcoming distance and size thereby allowing them to compete with their larger counterparts, SMEs could be on the wrong side of a digital divide. This is due to the fact that only a small proportion of them are realising substantial benefits from the Internet mainly because of a lack of technological expertise and uncertainty about the benefits offered by e-commerce (Daniel, Wilson, & Myers, 2002; Poon & Swatman, 1997; Walczuch, Van Braven, & Lundgren, 2000). Specific benefit-evaluation frameworks for e-marketplaces would go some way towards unravelling these uncertainties and would provide existing and potential market makers with an idea of the costs and benefits to be considered in establishing and maintaining these e-marketplaces. This would be particularly useful given the relative newness of the e-marketplace concept and especially as research indicates that generally the investments needed to create e-marketplaces are very high (Brunn et al., 2002; Government Office for The West Midlands, 2002, April 23).

This paper proposes an extension of the Updated D&M IS Success Model to consider a longitudinal approach and the context of the evaluation in determining the net benefits of a government-sponsored SME-REM. The

constructs of the extended conceptual model draw on data obtained from a literature review on e-marketplaces, SME participation in e-commerce and from an ongoing case study of a government-sponsored SME-REM in Western Australia. The proposed model is a starting point for further research on developing instruments to evaluate the benefits of SME-REMs.

EVALUATING THE BENEFITS OF GOVERNMENT-SPONSORED SME-REMS

Case Study

TwinTowns.com (actual names have been suppressed for reasons of confidentiality) is a community web portal incorporating community content and a REM set up by two neighbouring towns in Western Australia. It is intended to be an electronic gateway to access and interact with local players in the area. Registered users pay an annual fee of A$199 and an additional fee of A$99 for a business flyer page. The TwinTowns.com project has been running since 2000. A not for profit organisation was formed to 'own' the project, its founding members comprising representatives of the councils and business associations of the two towns and higher education institutes (HEIs) in the region. The project has been funded by the stakeholders, and by grants from two federal and state government bodies. In early 2002, the development of the portal was outsourced and in December 2002, the portal went live with a 'soft-launch'.

The presence of the REM within the portal is intended to spearhead regional economic activity by providing SMEs in the region with a low cost, low technology-compliance introduction into an e-marketplace. The REM comprises a business directory and an e-procurement mechanism for registered buyers to request for and receive quotations from registered regional SMEs and to place orders with them. The REM is one way of implementing a 'buy local' policy. The key motivations for development of the REM are increasing e-commerce adoption by SMEs, improving business efficiency and increasing trade within the locality, expansion into new markets and development of the region generally. To date, TwinTowns.com has a total of 100 registered REM participants and 37 community groups. The project has been plagued with problems mainly due to poor project management in the early stages and a huge underestimation of the resources required to develop and operate a SME-REM. Some of the problems resulted from a business plan that anticipated higher funding from state and federal government authorities, which eventually did not materialise.

At this point, case study data collected has been only from official documents and reports, through face-to-face discussions, e-mail correspondence and attendance at meetings with the REM sponsors and developers, and from the official web site of the organisation. This data has been used in developing the proposed model for evaluating the benefits of government-sponsored SME-REMs.

The DeLone & McLean IS Success Model

In 1992, in an effort to provide a comprehensive model of IS success, DeLone and McLean proposed a model (DeLone & McLean, 1992) synthesised from theoretical and empirical research in the area (see figure 1). This model was also meant as a guide to future researchers in the IS evaluation arena.
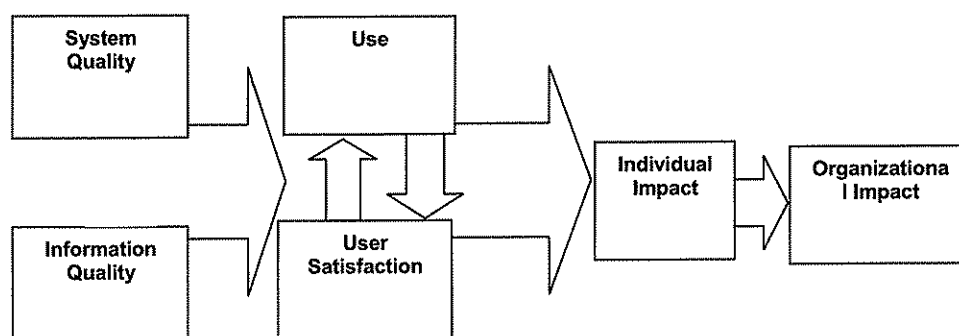

Figure 1. IS Success Model (DeLone and McLean, 1992, p. 87)

The original IS Success Model proposed by DeLone and McLean was based on research carried out in the 1970s and 1980s. The six dimensions of success in the D&M IS Success Model are interrelated and not independent and consider both process and cause. The process aspect of the model begins with the creation of the IS system and its features of varying quality which are then experienced by users and has an impact on their work and ultimately on the organisation. The causal aspect of the model deals with the causal relationship among the six dimensions of success, where a better quality system is expected to lead to greater use and have a positive impact on individual and organisational productivity. In the ten years since it was developed, the model has been

validated, refined, respecified and challenged. Controversy still surrounds the research and practice of evaluating the benefits of information systems due to the various interpretations on the types of benefits (tangible and intangible, easily-measured and no so easily measured) that can accrue from an information system and the different views or levels from which these benefits are assessed (technical, financial, individual, organisational, inter-organisational, strategic). For example, Seddon (cited in Ballantine et al., 1998, p. 47) proposed a variant which separates benefits from individual and organisational impact. In an effort to address these challenges, critiques and re-specifications and in recognition of the change and progress in the last decade of both the role of IS and the way in which academia has come to view the measurement of IS effectiveness, DeLone and McLean have updated their model of IS Success.

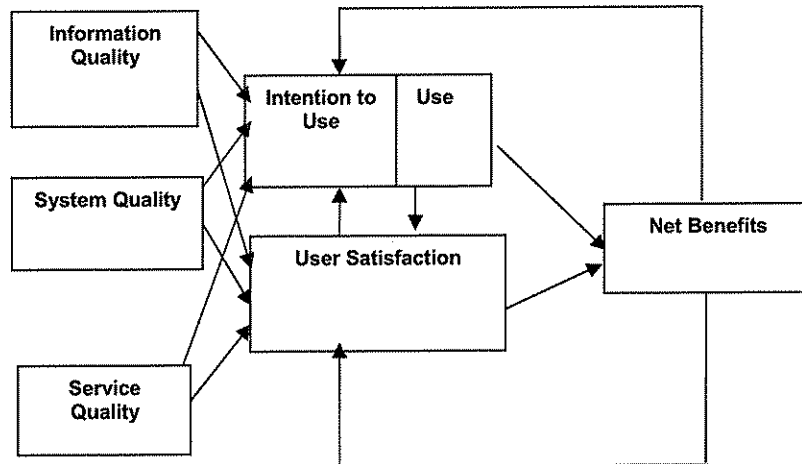## The Updated DeLone and McLean IS Success Model

Figure 2. Updated DeLone and McLean IS Success Model. (DeLone & McLean, 2003, p. 24).

The updated model is a useful starting point in evaluating the benefits of e-commerce systems. The inclusion of the service quality dimension recognises the user support services of the IS function especially as e-commerce systems become more pervasive. Individual and organisational impact is replaced by net benefits in an attempt to avoid complicating the model with the increasing number of entities on which the IS has an impact. In terms of e-commerce success, net benefits will measure the net impact of e-commerce on players like customers, suppliers, markets and even entire economies.

However, while DeLone & McLean (2003, p.27) have demonstrated that their updated model "is a useful model for developing comprehensive e-commerce success measures", they acknowledge that the context of the evaluation will determine the choice of IS success dimensions to be used in the evaluation. In this respect, the proposed conceptual model to evaluate the benefits of government-sponsored SME-REMs attempts to capture this important concept of context in an extension of the Updated D&M IS Success Model.

Another aspect of evaluation that has to be considered in evolving IS systems, is the need to account for the dynamic nature of these systems. As these systems evolve, so too do the benefits that can accrue from them. The context of the evaluation can also change with the passage of time and this needs to be reflected in the evaluation framework. This is especially so in a REM for SMEs who may need concrete and constant evidence of the benefits that they can get from e-marketplace participation.

Conceptual model to evaluate the benefits of Government-sponsored SME-REMs

Figure 3 illustrates the proposed model developed by the authors to evaluate the benefits of government-sponsored REMs for SMEs. The Updated D&M IS Success model is extended to consider context and a longitudinal approach.

In figure 3, the context of the evaluation is illustrated in two areas. Firstly, the types of benefits that would accrue from the SME-REM would depend on the structure of the market and its ownership model, which in turn are dependent upon the market maker's motivation for developing the SME-REM and the existing profile of SMEs in the region. Secondly, the evaluation of benefits would depend on which stakeholder's view is being considered ie buyers, sellers, owners, intermediaries, other stakeholders or the region.
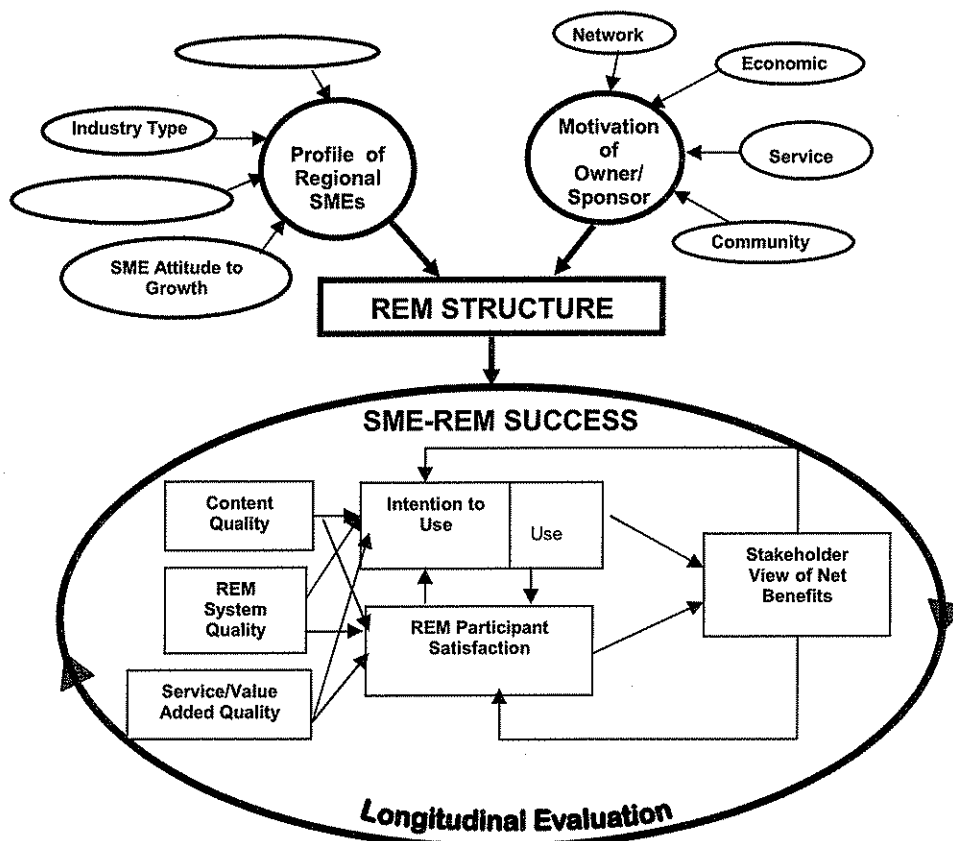
Figure 3. Conceptual model to evaluate the benefits of Government-Sponsored SME-REMs

Market Maker's Motivation

To evaluate the benefits of a SME-REM, the motivations for creating, owning and managing the e-marketplace needs to be considered and any conflict determined and resolved. Motivations for e-marketplace ownership can be determined according to whether they produce economic, network, service or community benefits. Economic benefits of e-marketplaces are: lower transaction costs and ability to pool markets for buyers; lower selling and transaction costs and access to wider markets for sellers (Porter, 2001) and the income generated from participation, transaction and advertising fees for neutral owners. The service motive of an e-marketplace owner is concerned with a need to provide participants with better services. For SME-REMs, this could be a reliable and trusted e-marketplace system and the help provided to enable SMEs to participate in it. The network view of e-marketplaces focuses on the motivation for inter-organisational relationships (Oliver, 1990). A digital knowledge network can potentially enable SMEs to compete with their larger counterparts that have larger internal networks and communities of practice (Braun, 2002). With the community motive, the main objective of the e-marketplace owner is to encourage adoption of e-marketplace trading to ultimately raise the levels of e-business knowledge, skills and technology within the community.

In a government-sponsored SME-REM, the marketplace owner is motivated by a combination of motives. The main motive is a community one and ownership needs to be unbiased, but the REM may still need to be economically viable especially if funding is limited. The market maker's motivation will then determine the REM structure and its exchange mechanisms, which in turn will determine the benefits to be obtained by the

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various stakeholders. For example, in TwinTowns.com, the motivation is to stimulate regional development by encouraging SMEs to participate in the REM via a 'buy local' policy. In order to do this, entry costs and technology-compliance costs for SMEs need to be low, unless the REM can guarantee or offer such superior services that will warrant the higher costs that participants will be willing to pay. To encourage participation in the early stages of the REM, the market maker may need to take a loss-leading position in the shorter term until such time that the REM can begin to provide revenue-generating value added services. Alternatively, the market maker can choose to absorb the costs under the banner of economic development, in which case, a longer period can be set aside for the REM to begin to show some returns (which could be intangible or indirect).

Profile of SMEs in the Region

The profile of the SMEs in a region will also have a bearing on the structure of the SME-REM and inter-alia on the type, level and timing of benefits that can be delivered. For example, the extent of e-readiness of SMEs in the region will determine the level of sophistication and the initial offerings that the SME-REM will display. If there is a low percentage of on-line SMEs in the region, the SME-REM may be developed in stages so that e-marketplace development can proceed in tandem with e-business sophistication of SMEs. In this case a large proportion of resources could be expended in the early stages on simply getting SMEs on-line and the benefits of knowledge networks and collaboration among SMEs in the on-line environment may only be realised in the longer term.

In a region where the SMEs are predominantly in manufacturing, the market mechanism may be a procurement tool to cater for B2B e-commerce, while the e-marketplace model in a region with SMEs predominantly in the retail industry could take the form of an e-mall to cater mainly for B2C e-commerce. A region already having strong offline SME networks or alliances may provide impetus for early on-line collaboration in SME-REMs. The attitude of SMEs in the region towards growth will also have a bearing on the structure of the market, its features offered and ultimately the benefits to be gained. If the majority of SMEs are lifestyle SMEs (Jeffcoate, Chappell, & Feindt, 2000), the owners of the SME-REM may choose to consider an e-marketplace model that reflects the SME owners' strategy for business growth (Levy & Powell, 2003).

Costs

The inclusion of the motivation framework and SME profile within the evaluation model also provides the market maker with an idea of the costs to be associated with addressing both the related issues of each motive and the profile of the SMEs in developing the e-marketplace. For example, the network motive will require the market maker to make provision for the cost of creating critical mass or liquidity on the REM. In the case of a SME-REM, the market maker may need to provide low cost training or advice to SMEs on e-commerce and REM participation. Grewal, Comer & Mehta (2001), hypothesised that organisational motivation and ability are important determinants of e-marketplace participation. There is a need to identify key players likely to trade on the REM and determine the cost to provide REM features that would motivate these players to join. Help must be given to them to migrate their transactions to the e-marketplace ie to transform them into 'experts' (Grewal et al., 2001) who can then become the motivation for others to join. The following table summarises the costs that could be associated with a government-sponsored SME-REM.

	Owners	Sellers	Buyers	Intermediaries
Direct Costs	Hardware/Software/ Network set-up & maintenance costs User Training & advice costs Marketing & Administration Overheads Provision of value added/ trust/ security services Maintaining parallel systems	Participation fee Transaction fee Flyer fee Hardware/software/ network & maintenance costs Administration costs Integration costs (business processes) Training costs	Hardware/software/ network & maintenance costs Administration costs Integration costs (business processes) Training costs	Advertising Hardware/software/ network costs Training costs
Indirect Costs	Opportunity cost	Time	Time	Time

Table 1. Summarised Costs - Government-sponsored SME-REM

Benefits

In order to examine the benefits of a government-sponsored SME-REM, the success metrics from the Updated D&M IS Success model (DeLone & McLean, 2003, p.26) have been used as a starting point. These were expanded to include benefits identified in both the business and academic literature on e-commerce (Molla &

Licker, 2001; Zhuang & Lederer, 2003, p. 71) and e-marketplaces (Bakos, 1991; Benjamin & Wigand, 1995; Kaplan & Sawhney, 2000; Standing & Stockdale, 2001). The context of the evaluation was also considered and the net benefits category was expanded to specifically identify benefits according to the two sub categories of individual/organisational/ industry benefits and regional benefits in line with the regional development context of the government-sponsored SME-REM. The resulting list of success metrics can be found in table 2 below.

Content Quality	REM System Quality	Service/Value Added Quality

Quality of content
Accuracy & currency of content
Security, Privacy, Authenticity
Comprehensiveness
Timeliness
Relevance
Completeness
 	
Quality of content presentation
Effective/meaningful organisation
  of content
Navigation techniques
Logical structure of content
Personalisation
	Reliability of software/network
	Accuracy of system
	Flexibility/Adaptability
	Ease of Use
	Online response time & page
	  loading speed
	System architecture
	Visual Appearance
	Convenience of accessibility
	Market reach
	Integration with participants'
	systems
		Trust
		Neutrality of market-maker
		Site intelligence (CRM)
		Feedback mechanisms
		Relevant search facilities
		Calculators
		Tracking capabilities
		Helpdesk/Set-up help/Advice
		Account maintenance
		Training (in conversion to e-business &
		  system use)
		FAQ's

Use	**REM Participant Satisfaction**	

Informational
Number of Hits/Visits
Transactional
Number of Transactions
 	
Community
Presence of & participation in
  networks
	Overall satisfaction
	
	_Satisfaction with REM Offerings
	  (Repeat visits, repeat
	  transactions, use of networks
	  and use of feedback
	  mechanisms)_
	Satisfaction with governance
	  structure	

Stakeholder Net Benefits		

**Industry/Organisational/
Individual Impact**
	Transactional Benefits
	Lower transaction, staff,
	  communication, search,
	  marketing/advertising,
	  inventory-holding costs
	Cheaper prices
	Lower inventory holdings
	
	Productivity gains
	Time savings
	Process efficiencies
	
	Wider market reach
		Strategic Benefits
		
		**Gains from Network Externalities &
		Collaboration**
		Image/Legitimacy
		Improved market share
		
		Improved communications with customers
		  (CRM), suppliers & employees
		Improved decision making process

Regional Impact		
	Economic Benefits	Community/Strategic Benefits
	Attractive location for business Attractive to skilled labour Efficient show-casing of regional offerings Reduced communication costs Increased productivity	Collaboration/Partnerships Cooperation Increased level of on-line participation Become a knowledge region Narrow/Close digital divide Relationships with other markets

Table 2. Government-Sponsored SME-REM Success Metrics

DISCUSSION

In reviewing the current state of the measurement of e-commerce benefits, Zhuang & Lederer (2003, p. 66) concluded that a 'comprehensive and parsimonious instrument for large-scale research on the benefits of e-commerce has yet to emerge and win wide acceptance'. To some extent this is due to the different contexts in which e-commerce benefits can be evaluated and to the continuing evolution of e-commerce models. To further muddy the waters, the e-marketplace landscape is itself characterised by different business models with different market mechanisms contingent upon the different motivations of the market makers and the profile of the market participants, and this landscape is by no means static. Attempting to design an instrument to measure the benefits of e-marketplaces should first of all begin with an IS evaluation framework that has been tested and tried and this can then be further developed to cater for the unique benefits that e-marketplaces offer. The original D&M IS Success model has been tested, refined, respecified and challenged resulting in an updated version addressing some of the issues raised. While it has yet to be tested, the following discussion will indicate that with some extensions, the benefits of a SME-REM can be comfortably mapped on to the six success dimensions of the Updated D&M IS Success Model.

Content Quality

In an e-marketplace, it is not only the quality of the information that is being presented that can affect participation but also the way in which the information is presented, hence the preference for the term content quality. SMEs need to be assured of the reliability and accuracy of the content as they have small margins for error in their businesses. However, given that many SMEs have time and resource constraints, the way in which the e-marketplace content is organised and the extent to which it can be personalised could have an effect on their attitude towards participation. Findings from a number of studies indicate that content quality can affect the satisfaction of web site users (Molla & Licker, 2001, p. 138).

REM System Quality

One of the motives for the development of a SME-REM is to give SMEs access to a low-cost, low technology-compliance entry into e-marketplace trading in an effort to stimulate online participation. For many SMEs this may be their first encounter with an Internet-based inter-organisational information system and the way in which the system performs is critical to their satisfaction and continued use. In the pilot run of the TwinTowns.com REM, system glitches were discovered where RFQs sent via the REM to suppliers were deposited into their in-boxes but the system did not notify the suppliers that they had been received. It was also found that the page loading speed of the REM was slow despite the use of an ADSL connection by the participant. These system shortcomings had a negative impact on the group of pilot users and on the project schedule. The extent to which the REM system can be integrated with participants' systems is also a measure of the system's quality. This is one of the instances where the need for the longitudinal approach to benefits evaluation comes into play. While in the short term the need for integration with the SMEs' systems may not be so critical, it will assume a bigger role as SMEs move further along the e-commerce adoption ladder towards the theoretical end-point of becoming e-businesses (Commission of the European Communities, 2003; DTI, 2001).

Service/Value Added Quality

Besides the low-cost, low technology-compliance entry to e-marketplace trading, why should SMEs join e-marketplaces? What makes REM participation different from SMEs having their own online presence? The quality of the services and value added features that the REM offers has an important effect on users' decision to participate and their continued satisfaction with the REM. Firstly the issue of trust in a government-sponsored SME-REM is one worth mentioning. SMEs need to trust that the market maker is looking out for the interest of the participants and not themselves. They need to know that their concerns and ideas will be taken seriously and

that the REM is a place for serious trading and not merely where 'empty' or 'ghost' RFQs are generated by competitors seeking to compare prices. In TwinTowns.com, the move to register buyers on the REM provides some mechanism of authenticity or trust. Although any consumer can place RFQs or orders with suppliers by accessing the links on the REM business directory, only registered users can place RFQs and orders via the REM. The service that the REM performs in providing SMEs with e-business training and REM usage, in connecting them with trusted providers of intermediary services (Lenz, Zimmerman, & Heitman, 2002) and in offering adequate technical help will have a bearing on the REM participants' satisfaction and use of the REM.

Use

The use of the REM covers activities like obtaining information (measurable by the number of hits), performing transactions (measurable by number of transactions) and participating in networks (measurable by the presence of and participation in clusters and forums). While there has been some argument over 'use' as a measurement of success in IS evaluation, use of a government-sponsored SME-REM is entirely at the discretion of the participant and is therefore a good indicator of REM success.

REM Participant Satisfaction

This is a measure of how participants feel about all aspects of the REM. Feedback mechanisms can be used to measure satisfaction, as can indicators like repeat visits and transactions and discussion forums.

Net Benefits

This is ultimately the measure of how successful the REM is and its measurement is dependent on the categories mentioned above. This is again one area where the longitudinal approach to the evaluation assumes an important role as some of the benefits may only be realised in the longer term. Some of the SME-REM net benefits measurements would still be the ones 'developed and tested for IS investments in general' (DeLone & McLean, 2003, p. 25). These would measure the benefits that fall under the individual and organisational net transactional benefits categories. Measures would need to be designed to determine the industry/organisational/individual net strategic benefits as well as the added dimension of regional net benefits in the case of government-sponsored SME-REMs. For example, in the case of TwinTowns.com a measure of the benefit of the REM causing more SMEs to get online could be whether or not the number of regional SMEs online has increased as a direct result of the presence of the REM. Similarly, a measure of whether or not the REM leads to regional economic development could be reflected in the amount of additional business created via the REM for local businesses. Needless to say, developing tools to measure the impact of the REM on strategic and regional benefits will be a difficult task.

While the benefits of a SME-REM can be classified under the six success metrics of the Updated D&M IS Success model, the recurring warnings in the literature that each evaluation exercise needs to recognise the context within which it is carried out, has prompted the authors to attempt to capture context in the proposed model to evaluate the benefits of government-sponsored SME-REMs. The dynamic nature of the e-marketplace landscape has also influenced the authors' decision to include the longitudinal approach in the proposed model.

CONCLUSION

The advent of e-commerce and the Internet has added a new dimension to the evaluation of IS benefits. While some instruments have been developed to measure the benefits of e-commerce, this is lacking in the area of e-marketplace evaluation. However, the proliferation of e-marketplaces and the subsequent shake-up and contraction in the last few years warrants the need for a framework to evaluate the benefits that e-marketplaces can offer. This need is given further credence by the number of e-marketplaces being developed for SMEs, often where the market makers or owners do not have a full understanding of the costs that these types of e-marketplaces can involve, and the benefits that can accrue from them.

While existing IS evaluation frameworks like the updated D&M IS Success Model can be used to evaluate e-marketplaces, the growing number of SME-REMs and the different contexts within which they can be viewed, call for an evaluation framework that can encompass a more holistic approach to e-marketplace evaluation. Such a framework would have to clearly identify the contexts within which the evaluation can be conducted and display the need for a longitudinal approach. It is upon frameworks such as these that evaluation instruments and tools should be developed to rigorously examine the benefits of government-sponsored SME-REMs.

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