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December 2006

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Recommended Citation

Mahmood, Adam; Solis, Adriano; Gemoets, Leopoldo; and Hall, Laura, "An E-Enabled Supply Chain Management Success Model Including the Service Quality Dimension: An Empirical Investigation" (2006). *AMCIS 2006 Proceedings*. 28.
<http://aisel.aisnet.org/amcis2006/28>

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An E-Enabled Supply Chain Management Success Model Including the Service Quality Dimension: An Empirical Investigation

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ABSTRACT

The present research-in-progress makes significant contribution to the research in the e-enabled supply chain management (eSCM) area by extending the DeLone and McLean information systems success model and e-commerce success model to an eSCM success model. It also extends the earlier Mahmood et al. (2005) eSCM success model by incorporating the service quality construct introduced in the DeLone and McLean (2003) updated IS success model. The current model, to the best of our knowledge, is the first model which will allow us to *empirically* assess eSCM success that takes into account the service quality component. It is, therefore, better than what is available in the literature at least at the present time. The study examines the use of eCommerce technologies in SCM in terms of the following six constructs: (1) eSCM system quality, (2) eSCM information quality, (3) eSCM service quality, (4) eSCM system usage, (5) eSCM system user satisfaction, and (6) net benefits.

Keywords

Supply chain management (SCM), e-enabled supply chain management (eSCM), service quality, empirical investigation.

INTRODUCTION

The development of eCommerce technologies such as the Internet/world wide web, intranets, and extranets have created many opportunities for businesses to effectively manage and streamline their supply chains. Very few studies have been conducted to date on the extent to which these technologies have been utilized in supply chain management (SCM), and, more importantly, on whether or not e-enabled supply chain management (eSCM) has brought about improvements in managing supply chains.

DeLone and McLean IS Success Model

DeLone and McLean (1992) proposed interrelationships among the following six IS dimensions in what is commonly referred to as the 'DeLone and McLean (D&M) IS Success Model': (1) system quality, (2) information quality, (3) system usage, (4) user satisfaction, (5) individual impact, and (6) organizational impact. The original model organized the choice of IS success factors and contained six dimensions including System Quality (the measure of the information processing system itself), Information Quality (the measure of information system output), System Usage (the measure of recipient consumption of the output of an information system), User Satisfaction (the measure of recipient response to the use of the output of an information system), Individual Impact (the measure of the effect of information on the recipient), and Organizational Impact (the measure of the effect of information on organizational performance). The idea is that an individual's use of a system will impact the performance of that individual in the workplace. The impact on the individual will impact the organization.

While DeLone and McLean postulated causal relationships, they did not test these relationships empirically. Since 1992, however, a fairly good number of empirical investigations have been undertaken of the various interrelationships proposed in the D&M model. DeLone and McLean (2003) themselves provided a ten-year update of the model, reviewing the results of 16 empirical investigations that have supported (or *not* supported) the postulated relationships. They have also updated their model with new or revised constructs as follows: (1) the addition of *service quality* as a new construct, to address a third

major dimension of quality, and (2) the replacement of the earlier individual impact and organizational impact constructs by a *net benefits* construct (cost savings, expanded markets, incremental additional sales, reduced search costs, time savings).

Service Quality Construct

SERVQUAL, first developed by marketing researchers, was first applied to the measure of IS service quality in the 1990s (Watson, Pitt, and Kavan, 1998; Kettinger and Lee, 1994). Service quality assesses the customer's perceived service on a multi-item scale, which includes the dimensions of tangibles, reliability, responsiveness, assurance, and empathy (Parasuraman, Zeithaml, and Berry, 1988).

Watson et al. (1998) suggest that service quality is "not a fad but an ongoing commitment" and requires strategic, tactical, and operational considerations. Therefore, many researchers have deemed service quality as an important dimension of IS success (Rands, 1992; Ferguson and Zawacki, 1993; Kettinger and Lee, 1994; Pitt, Watson, and Kavan, 1995). Ferguson and Zawacki (1993) report service quality as a critical success factor in IS organizations.

eCommerce Success Model

DeLone and McLean (2004) proposed that the same six dimensions in their updated IS success model (DeLone and McLean, 2003)—i.e., (1) system quality, (2) information quality, (3) service quality, (4) usage, (5) user satisfaction, and (6) net benefits—may be used for measuring eCommerce success. They proceeded to apply these eCommerce success measures to two case examples, Barnes & Noble and 'ME Electronics' (with the name of the latter company changed for confidentiality). While they argue that the two case examples provide logically compelling support for these eCommerce success measures, they do admit a need to test these measures empirically.

METHODOLOGY

Earlier Exploratory Study

Originally, Mahmood, Solis, Gemoets, Hall, and Hebbal (2005) designed a 47-item instrument to measure the impact of e-commerce technologies on SCM, based on only five constructs: (1) eSCM system quality, (2) eSCM information quality, (3) eSCM system usage, (4) eSCM system user satisfaction, and (5) organizational impact. A seven-point Likert-type scale (strongly agree = 7, agree = 6, somewhat agree = 5, neutral = 4, somewhat disagree = 3, disagree = 2, and strongly disagree = 1) was applied for each item in the instrument. They conducted an exploratory study using the original 47-item instrument utilizing a sample of the automotive and electronic industry-related *maquiladoras* operating in the Mexican city of Juárez (Mahmood, et al., 2005). The *maquila* industry, introduced in Mexico in the 1960s, is based on components being exported from the United States into Mexico for assembly and the assembled products being imported back into the United States—with tariffs and duties being imposed only on the value added. Only thirty-six responses were received. Thirty-three responses were found usable. Due to the small sample size, Mahmood et al. (2005) were unable to validate, using structural equation modeling, the majority of the hypotheses put forth in their five-construct eSCM system success model.

New Survey Instrument

In the current study, we look into the following six constructs: (1) eSCM system quality [*SysQ*], (2) eSCM information quality [*IQ*], (3) eSCM service quality [*SvcQ*], (4) eSCM system usage [*SU*], (5) eSCM user satisfaction [*US*], and (6) net benefits [*NB*]. Some researchers (e.g., Chen and Paulraj, 2004) have criticized the use of overall firm performance as a direct measure of supply chain performance and have suggested the use of two constructs, operational supply chain performance and overall firm performance. In the current study, we choose to apply a single net benefits construct, consistent with the treatment in the D&M updated IS success model (DeLone and McLean, 2003) and D&M eCommerce success model (DeLone and McLean, 2004).

A new 33-item instrument (see Appendix) has been designed, which now includes the new service quality construct (DeLone and McLean, 2003, 2004) and refers to net benefits (in place of organizational impact). For each of the five earlier constructs, items with the highest factor loadings in the construct validation (Mahmood et al., 2005), generally between 0.93 and 0.98, were selected, resulting in 28 items. Five items were selected from the Jiang, Klein, and Carr (2002) service quality instrument, bringing the total number of items to 33. A seven-point Likert-type scale (strongly agree = 7, agree = 6, somewhat agree = 5, neutral = 4, somewhat disagree = 3, disagree = 2, and strongly disagree = 1) is used for each item in the instrument.

Data will be collected from a larger population: *maquiladoras* operating in the Mexican cities of Juárez, Chihuahua, and Tijuana.

HYPOTHESES AND PROPOSED MODEL

The premise that increases in system quality will cause increases in user satisfaction has been studied fairly extensively by a number of researchers. Seddon and Kiew (1994), for example, investigated users trained on a Departmental Accounting System to test this hypothesis and found a significant relationship between system quality and user satisfaction. We propose the following hypothesis:

[H1] *eSCM system quality will positively influence eSCM user satisfaction.*

Igbaria, Zinatelli, Cragg, and Cavaye (1997), using the Technology Acceptance Model (TAM), measured system quality in terms of perceived ease of use and perceived usefulness, and system usage in terms of personal computing acceptance among users in small firms. They found system quality to have a significant influence on system usage. Taylor and Todd (1995) applied TAM, the Theory of Planned Behavior (TPB), and a decomposed variation of TPB in evaluating usage of a student computer lab. They found a significant impact of system quality on system usage, with the latter measured in terms of perceived usefulness and ease of use.

The foregoing discussion leads us to our second hypothesis.

[H2] *eSCM system quality will positively influence eSCM system usage.*

The IS success literature is replete with research studies empirically validating the relationship between information quality and user satisfaction (e.g., Hunton and Flowers, 1997; Seddon and Kiew, 1994; Rai, Lang, and Welker, 2002). Kuan, Bock, and Vathanophas (2005) found empirical support for information quality positively influencing user satisfaction with the system. Chae, Kim, Kim, and Ryu (2002) suggested that information quality, in the eCommerce area, is expected to impact customer loyalty through user satisfaction. These authors empirically found a positive relationship between information quality and user satisfaction.

We accordingly propose a third hypothesis.

[H3] *eSCM information quality will positively influence eSCM user satisfaction.*

Current literature shows that the higher the quality of the information the more the system is used successfully (Palmer, 2002; Seddon, 1997). Khalil and Elkordy (1999) also found a highly significant correlation between information quality and system usage. Kuan et al. (2005) found empirical support for information quality positively influencing the usage of the system.

We put forward a fourth hypothesis.

[H4] *eSCM information quality will positively influence eSCM system usage.*

Service quality is defined by Parasuraman et al. (1988) in terms of reducing the gap between customers' expectations for excellent service and their perceptions of services delivered. Although related, service quality differs from user satisfaction by the focus on expectations (Franklin and Nitecki, 1999). Individuals form their impressions of service quality based on transactions or encounters experienced by the individual (Hernon and Altman, 1998). We present a fifth hypothesis.

[H5] *eSCM service quality will positively influence eSCM user satisfaction.*

Both the TAM and TPB models consider attitudes toward using the system as influencing system use. However, IS service quality has traditionally been focused on IS products instead of the services associated with these products. Because service quality is defined in terms of reducing the gap between customers' expectations and perceptions of services delivered, we propose a sixth hypothesis.

[H6] *eSCM service quality will positively influence eSCM system usage.*

The literature provides primarily evidence of linear correlation between system usage and user satisfaction. Igbaria and Tan (1997), though, found user satisfaction to be an important factor that affects system usage. Yoon and Guimaraes (1995), using data collected on expert systems developed through IBM's Manufacturing Expert Systems Project, established a highly significant relationship between system usage and user satisfaction. Likewise, Torkzadeh and Doll (1999) found a highly significant correlation between system usage (expressed as "usage pattern") and user satisfaction. Khalil and Elkordy (1999) found a positive correlation between user satisfaction and system usage.

On the basis of the foregoing, we present a seventh hypothesis.

[H7] *eSCM user satisfaction and eSCM system usage will positively influence each other.*

The literature on the relationship between user satisfaction and organizational impact, unfortunately, is not clear. Etezadi-Amoli and Farhoomand (1996) found a strong relationship between user satisfaction and organizational performance. Gelderman (1998) also found a positive and significant relationship between user satisfaction and organizational performance. We accordingly propose an eighth hypothesis.

[H8] *eSCM user satisfaction will lead to net benefits for the organization.*

It is suggested in the information systems literature that informed and effective systems use is an important indication of information systems success. Systems usage is especially important in the eCommerce context since this kind usage is largely voluntary (Molla and Licker, 2001). Etezadi-Amoli and Farhoomand (1996) found a strong relationship between system usage and organizational performance. Gelderman (1998) also found a positive relationship between the two. We present a ninth hypothesis.

[H9] *eSCM system usage will lead to net benefits for the organization.*

On the basis of the nine hypotheses stated above, we propose a model for eSCM system success as presented in Figure 1.

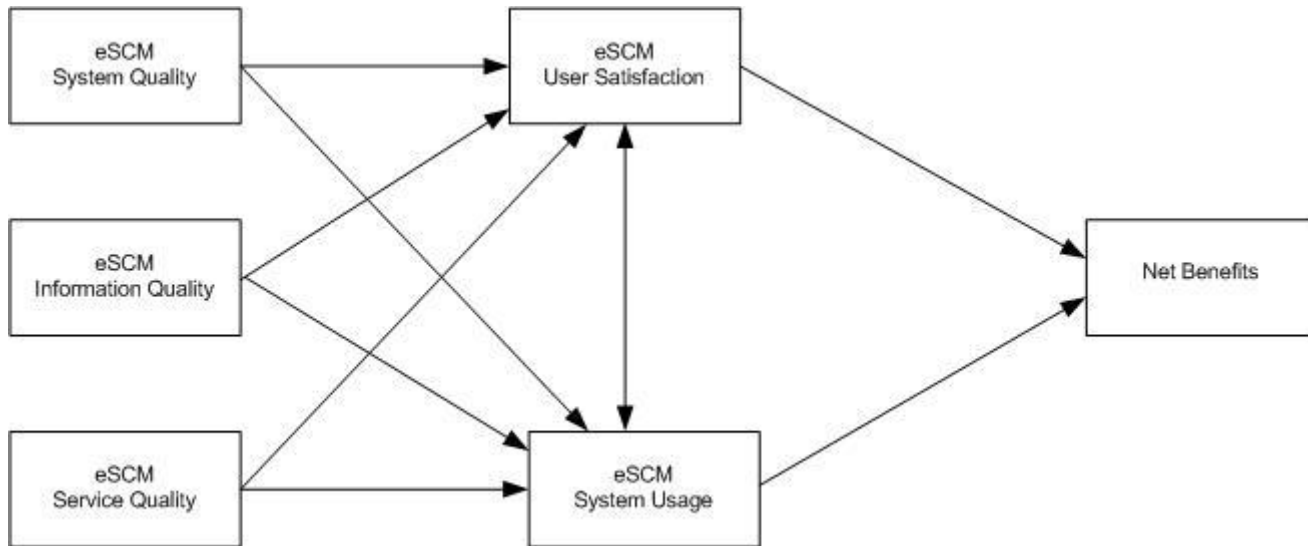


Figure 1. Proposed eSCM System Success Model

EXPECTED CONTRIBUTION OF THIS RESEARCH

The present research makes significant contribution to the research in the eSCM area. We extend the D&M IS (DeLone and McLean, 1992, 2003) and eCommerce (DeLone and McLean, 2004) success models to the context of eSCM systems, yielding the eSCM system success model shown in Figure 1. Mahmood et al. (2005) earlier proposed an eSCM system success model, which did not include the service quality construct introduced in the DeLone and McLean (2003) updated IS success model. This model, to the best of our knowledge, is the first model which will allow us to empirically assess eSCM system success that takes into account the service quality component. It is, therefore, better than what is available in the literature at least at the present time.

This research in progress which used the aforementioned model, to the best of our knowledge, will be the first empirical assessment of eSCM system success which also takes into account the service quality construct. More specifically, the present research presents a model that integrates different eSCM-related antecedents that may result in net benefits to the organization. It will endeavor to empirically validate the model using the structural equation modeling approach. We anticipate being able to present at the time of the conference the results of our empirical investigation.

REFERENCES

1. Chen, I.J. and Paulraj, A. (2004). Understanding supply chain management: critical research and a theoretical framework, *International Journal of Production Research*, 42, 1, 131-163.
2. Chae, M., Kim, J., Kim, H. and Ryu, H. (2002). Information quality for mobile Internet services: A theoretical model with empirical validation. *Electronic Markets*, 12, 1, 24-34.
3. DeLone, W.H. and McLean, E.R. (1992). Information systems success: The quest for the dependent variable, *Information Systems Research*, 3, 1, 60-95.
4. DeLone, W.H. and McLean, E.R. (2003). The DeLone and McLean model of information systems success: A ten-year update, *Journal of Management Information Systems*, 19, 4, 9-30.
5. DeLone, W.H. and McLean, E.R. (2004). Measuring e-commerce success: Applying the DeLone & McLean information systems success model, *International Journal of Electronic Commerce*, 9, 1, 31-47.
6. Etezadi-Amoli, J. and Farhoomand, A.F. (1996). A structural model of end user computing satisfaction and user performance, *Information & Management*, 30, 2, 65-73.
7. Ferguson, J. M. and Zawacki, R.A. (1993). Service quality: A critical success factor for IS organizations, *Information Strategy: The Executive's Journal*, 9, 2, 24-30.
8. Franklin, B. and Nitecki, D. (1999). User satisfaction white paper, Washington, DC: Association of Research Libraries.
9. Gelderman, M. (1998). The relation between user satisfaction, usage of information systems, and performance, *Information & Management*, 34, 1, 11-18.
10. Hernon, P. and Altman, E. (1998). *Assessing Service Quality: Satisfying the expectations of library customers*. Chicago: American Library Association.
11. Hunton, J.E. and Flowers, L. (1997). Information technology in accounting: Assessing the impact on accountants and organizations. In Sutton, S.C. (ed.), *Advances in Accounting Information Systems*, JAI Press Inc., London, 3-34.
12. Igbaria, M. and Tan, M. (1997). The consequences of information technology acceptance on subsequent individual performance, *Information & Management*, 32, 3, 113-121.
13. Igbaria, M., Zinatelli, N., Cragg, P. and Cavaye, A. (1997). Personal computing acceptance factors in small firms: A structural equation model. *MIS Quarterly*, 21, 3, 279-302.
14. Jiang, J.J., Klein, G. and Carr, C.L. (2002). Measuring information system service quality: SERVQUAL from the other side, *MIS Quarterly*, 26, 2, 145-166.
15. Kettinger, W.J. and Lee, C.C. (1994). Perceived service quality and user satisfaction with the information services function, *Decision Sciences*, 25, 5/6, 737-766.
16. Khalil, O.E. and Elkordy, M.M. (1999). The relationship between user satisfaction and systems usage: empirical evidence from Egypt, *Journal of End User Computing*, 11, 2, 21-28.
17. Kuan, H.H., Bock, G.W. and Vathanophas, V. (2005). Comparing the effects of usability on customer conversion and retention at e-commerce websites, *Proceedings of the 38th Hawaii International Conference on System Sciences*, Hawaii, January 2005.
18. Mahmood, M.A., Solis, A.O., Gemoets, L.A., Hall, L.L. and Hebbal, V. (2005). A preliminary assessment of the impact of e-commerce technologies in supply chain management, *Proceedings of the 36th Annual Meeting of the Decision Sciences Institute*, November 19-22, San Francisco, CA, USA, 16251-16256.
19. Molla, A. and Licker, P.S. (2001). E-commerce systems success: An attempt to extend and respecify the DeLone and McLean model of IS success, *Journal of Electronic Commerce Research*, 2, 4, 131-141.
20. Palmer, J.W. (2002). Web site usability, design and performance metrics, *Information Systems Research*, 13, 2, 151-167.
21. Parasuraman, Zeithaml and Berry (1998). SERVQUAL: A multiple-item scale for measuring customer perceptions of service quality, *Journal of Retailing*, Spring 1988, 12-40.

22. Pitt, L., Watson, R. and Kavan, C. (1995). Service quality: a measure of information systems effectiveness, *MIS Quarterly*, 19, 2, 173-187.
23. Rai, A., Lang, S.S. and Welker, R.B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis, *Information Systems Research*, 13, 1, 50-69.
24. Rands, T. (1992). The key role of applications software make-or-buy decisions, *Journal of Strategic Information Systems*, 1, 4, 215-23.
25. Seddon, P.B. (1997). A respecification and extension of the DeLone and McLean model of IS success, *Information Systems Research*, 8, 3, 240-253.
26. Seddon, P.B. and Kiew, M.-Y. (1994). A partial test and development of the DeLone and McLean model of IS success, *Information Systems Research*, 13, 1, 50-69.
27. Taylor, S. and Todd, P.A. (1995). Understanding information technology usage: A test of competing models, *Information Systems Research*, 6, 2, 144--176.
28. Torkzadeh, G. and Doll, W.J. (1999). The development of a tool for measuring the perceived impact of information technology on work, *Omega, The International Journal of Management Science*, 27, 3, 327-339.
29. Watson, R., Pitt, L. and Kavan, C. (1998). Information systems service quality: lessons from two longitudinal case studies, *MIS Quarterly*, 22, 1, 61-79.
30. Yoon, Y. and Guimaraes, T. (1995). Assessing expert systems impact on end users' jobs, *Journal of Management Information Systems*, 12, 1, 225-249.

APPENDIX

Survey Instrument

A. eSCM System Quality

1. Our SCM system is easy to use and user friendly.
2. Our SCM system is easy to learn.
3. Our SCM system is equipped with useful system features and functions.
4. Our SCM system ensures shorter response times.
5. Our SCM system can be conveniently accessed internally.
6. Our SCM system is accurate.

B. eSCM Information Quality

7. Output information is easy to understand (clarity).
8. Output information is concise.
9. Output information is current.
10. Output contents are relevant.
11. Output contents are reliable.

C. eSCM Service Quality

12. When the unit responsible for the SCM system promises to do something by a certain time, it does so.
13. When users have a problem, the unit responsible for the SCM system shows a sincere interest in solving it.
14. The unit responsible for the SCM system is dependable.
15. Employees of the unit responsible for the SCM system will have the knowledge to do their job well.
16. The unit responsible for the SCM system gives users individual attention.

D. eSCM User Satisfaction

17. Users have experienced improved overall satisfaction with our SCM system.
18. Our SCM system satisfies the information needs for interacting and transacting with the suppliers.
19. Our SCM system satisfies the information needs for interacting and transacting with the customers.
20. Our SCM system satisfies the communication needs for interacting and transacting with the customers.
21. Our SCM system satisfies the internal communication needs.

E. eSCM System Usage

22. Use of our SCM system is mandatory for our suppliers.
23. There exists an Internet enabled system for information sharing.
24. An effective extranet exists for communication with suppliers and customers.
25. Our SCM system provides continuous monitoring of the inventory and purchase situation.
26. An effective electronic system exists for distribution of our products.
27. Our SCM system is fully integrated with the existing internal systems.

F. Net Benefits

28. We have achieved a reduction in inventory carrying costs.
29. Delivered costs of the materials coming from our suppliers have generally decreased.
30. Delivered costs of our products to our customers have generally decreased.
31. Our plant has experienced an increase in revenues.
32. Our plant has experienced an increase in ratio of net income to invested capital.
33. Our plant has experienced an increase in the ratio of sales to total assets.