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Perceived Importance of Success Factors of Firms Practicing E-Logistics in Supply Chain: An Exploratory Study on Extranet

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Abstract

One way to enhance the success of supply chain is through the adoption of e-logistics. Much literature discuss the success stories of supply chain, it is however lacked of the determination of its success factors in the e-logistics environment. Extranet is considered as an enabler/system that could enrich the betterment of service quality in e-logistics. This paper identifies four success factors influencing to the success of Extranet; namely the quality of system, information, service and work performance. Furthermore, the analysis on its significant decision variables in each success factor through the concept of SERVQUAL is also presented.

1. Introduction

Traditionally, the focus of supply chain was on connection, transaction, and delivery. In today's faster-paced markets, the focus has shifted to meet market demands rapidly, correctly, and profitably. With materials flowing downstream from suppliers, manufacturers, warehouses, stores to customers and information flowing in both directions, supply chain must maintain and sustain technology-based and quality-driven capabilities in order to minimize systemwide costs, reduce lead time and transit time, and improve customer service levels. To this end, supply chain must be managed effectively. Thus, it reveals in many supply chain literature that the focus of quality-based paradigm has also shifted from the traditional company-centered setting to complete supply chain system with the implementation of e-logistics [3]. This phenomenon is especially true for the Hong Kong environment whereby it is highly critical competitive advantage of being to access the low cost production capabilities in China [5]. The adoption of e-logistics in supply chain in a form of Extranet (External Intranet), such as e-fulfillment, is a mean to which most companies seeking it as an enabler to enrich their betterment of service quality with their customers or trading partners.

Extranet is an extension version of Intranet application that applying Web technologies on the public Internet, but restricts access to a group of registered users only. With the extensive use of Extranet in the B-B environment, registered customers could gain a better understanding on the need of demand and supply of the procurement or

operations events with their trading partners. Most Extranet systems made available in the supply chain environment may also enhance the three basic functions of Intranets including (1) to create internal bulletin board that publishes information electronically, (2) to establish a distribution platform that enhances information exchanges between partners, and (3) to support daily business functions such as decision-making and training. The study of success factors and its quality of services in Intranet is plentiful in literature, such as Lai [4]. However, the success factors that influencing the Extranet has not been properly addressed in literature.

The objective of this paper is thus to remedy this deficiency by studying the success factors of Extranet in the supply chain. This paper proposes to firstly identify a set of decision variables from relevant literature and then collect data to determine its success factors. This paper adopts the exploratory factor analysis method to determine its success factors. In next section, this paper will first present the study design and measures, and then follow with the results, discussion and conclusion of our findings.

2. Study Design and Measures

2.1 Data Collection Procedure

A structured questionnaire with a cover letter was used to collect data through direct e-mails and telephone interviews. The method of telephone interview was to follow to those respondents who did not reply within four weeks after the mails were sent. 380 respondents were randomly selected from the URL homepage of <http://www.tdctrade.com>. This database is selected mainly because it provides a comprehensive web database that consists of companies adopting e-logistics and Extranet systems after the phone-calls confirmation. A total of 105 participated, with 2 incomplete questionnaires were discarded from the returned mails. Therefore, a total of 103 questionnaires was used for the data analysis, which constitutes of response rate of 27.6%. The average working experience with Extranet of our respondents was reported as 2.95 years with standard deviation of 0.51 year. Participants have been with the present company for

average of 5.46 years. These information show that the participants are conversant with the Extranet in their company. Our participants are from the industries of delivery services (including air cargo services), freight, transportation, wholesalers, trading, and logistics firms. All of our participants are presently holding a managerial position.

2.2 Data Analysis

This paper adopted the following methods for data analysis:

- 1) Construct validity. This paper adopted KMO (Kaiser-Meyer-Olkin) values to measure the adequacy of the samples. KMO values are typically used to judge if a group of decision variables is suitable for analyzing as the success factors when the exploration factor analysis method is used. The KMO value of 0.5 is considered to be acceptable condition.
- 2) Reliability test. This paper adopted internal consistency method to test if a set of decision variables in a cluster is homogeneous. A reliability coefficient $\lambda \geq 0.6$ in a cluster is considered as sufficient condition to conclude a high consistency of decision variables.
- 3) Exploratory factor analysis. A general guideline is that a value of factor loading $\geq \pm 0.5$ for a decision variable is considered as practically and significantly contribution to that factor.
- 4) SERVQUAL measure. This paper adopted the SERVQUAL measure Kettinger and Choong [2]. The service quality of Extranet can be measured by computing firstly Extranet perceptual scores by subtracting values of Extranet Performance scores of the company from scores collected from their customers. Gap correlation is then obtained by studying the correlation of Extranet Perceptual scores with the Overall Extranet User Satisfaction scores.

2.3 Measures

Compiling a list of relevant decision variables is firstly needed in prior to the determination of success factors for the Extranet in e-logistics. However, it is indisputable that its relevant literature is limited. In such, this paper proposes to concentrate and identify its relevant decision variables that frequently addressed in the Intranet literature. This approach is justified mainly because both these two systems share many similar features. In total, a total of eighteen decision variables that are commonly applied to Extranet environment are identified and they are: X1 = The system maintains consistently and regularly, X2= The system provides user-menu/instructions, X3= The system enhances the collaboration among group members, X4= The systems produces accurate search results/information, X5= The system gives a standardized display format (screen layout), X6= The system adopts Data security/privacy, X7= The system improves personal productivity, X8= The organization provides technical

support competently, X9= The system improves the business communication, X10= The system enhances fast response time, X11= The system provides standardized retrieval procedure, X12= The organization provides training, X13= The system provides most up-to-date information, X14= The system provides standardized search procedure, X15= The system eases to use, X16= The system improves the quality of decision-making, X17= The system helps to make decision faster, and X18= The system allows faster exchange of information.

These eighteen decision variables are used to develop two sets of questionnaire. The first set is to ask participants to evaluate their expected performance of their Extranet system in a measurement scale 1 to 5; where a value 5 represents as most important one, and value 1 as least important one. The second measurement is to ask their customers/trading partners to rate the actual Extranet performance based on the criterion of each decision variable, in a measurement scale of 1 to 5; where a value 5 represents strongly agree, a value 1 as strong disagree. In addition, we also adopted three questions to ask their customers/trading partners to evaluate the overall satisfactory of the Extranet system in a measurement scale of 1 to 5, with value 5 as excellent, and value 1 as poor performance. These three questions are used to performance the correlation described in the SERVQUAL measurement. These three questions are adopted with modification from the paper of Chow and Lui [1]. In the questionnaire, we also asked participants to consider the term "The system" be treated as "The Extranet system" and that they could consider e-fulfillment system adopted in their company is an example for such a system in the e-logistics environment.

3. Results and Discussions

Table 1 shows the result findings of our proposed study of success factors for the Extranet. In this table, there are three information included in each row of column one, namely labels of the success factor for the Extranet, reliability values λ , and KMO values. Column 2 represents the coded decision variables shown in the above section. Column 3 is the factor loadings of each decision variable. Expected and actual performance of Extranet are shown in columns 4 and 5. Perceptual performance, that is (expected performance value - Actual performance value), is listed in column 6. The correlation between perceptual performance of Extranet with overall Extranet user satisfaction is shown in the last column.

In column one, all KMO values are great then 0.5. It is therefore concluded that samples adopted in this study have reached to a sufficient condition to perform further analysis. Similarly, all reliability values $\lambda \geq 0.6$, and thus it shown that that decision variables included in each grouping is highly consistent. In analyzing factor loadings within each grouping, column 3 shows that all factor loadings $\geq \pm 0.5$, which implied that each decision

variable is significantly and practically contributed to each grouping. All expectation values in the above table have values great than 3, which implied that all these decision variables are significantly important to the success of Extranet. The perceptual scores are all negative values, which indicated that the performance of Extranet does not match perfectly with their customers' expectation.

In the last column, values with "*" or "**" representing decision variables that are considered as good potential indicators to the overall Extranet satisfaction. However, one must clear that those remaining ones do not representing insignificant to the contribution on the success of Extranet.

There are four success factors that contributing as success factors of Extranet. The first one is system quality. Decision variables related to this success factor are X2 = The system provides user-menu/instructions, X6= The systems adopts data security/privacy, X10 = The system enhances fast response time, X11 = The system provides standardized retrieval procedure, and X14 = The systems provides standardized search procedure, and X15 = The system eases to use. Second success factor of Extranet is information quality, which consists decision variables of X4 = The system produces accurate search results/information, X5 = The system gives a standardized display format (screen layout), and X13 = The system provides most up-to-date information. Third success factor is service quality. Decision variables are X1 = The system maintains consistently and regularly maintained, X8 = The organization provides technical support competently, and X12 = The organization provides training. Forth success factor is work performance quality. The corresponding decision variables are X3 = The system enhances the collaboration among group members, X7 = The system improves personal productivity, X9 = The system improves the business communication, X16 = The system improves the quality of decision-making, X17 = The system helps to make decision faster, and X18 = The system allows faster exchange of information. These four success factors are crucial and needed to be carefully considered when launching an Extranet system in the e-Business environment.

In analyzing the indicators of overall Extranet user satisfaction, four decision variables are significant in system quality success factor. These four decision variables are X10 = The system enhances fast response time, X11 = The system provides standardized retrieval procedure, X14 = The system provides standardized search procedure, and X15 = The system eases to use. In information quality success factor, two indicators of overall Extranet user satisfaction are X4 = The system produces accurate search results/information, X5 = The

system gives a standardized display format (screen layout). However, there is only one good indicator in service quality success factor, namely, X8 = The organization provides technical support competently. At last, there are three good indicators can be identified in work performance quality. They are X9 = The system improves the business communication, X17 = The system helps to make decision faster, and X18 = The system allows faster exchange of information.

Organizations should emphasize on these decision variables so that the overall user satisfaction of Extranet can further be enhanced.

4. Conclusion

This paper has two contributions. First, it has identified four success factors of Extranet in e-logistics. These four success factors are system quality, information quality, service quality, and work performance quality. Second, it has determined a set of good indicators to enhance the overall user satisfaction on Extranet. A total of 10 decision variables are identified as good indicators. These indicators are 1) fast response time is enhanced, 2) Extranet system is easy to use, 3) search procedure is standardized, 4) retrieval procedure is standardized, 5) display format (screen layout) is standardized, 6) search results are accurate, 7) system support staff are technical competence. 8) Extranet system allows faster exchange of information, 9) Extranet system improves the business communication, and 10) Extranet system helps to make decision faster.

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Table 1: Result findings

	D.V.	Factor Loadings	Expected Performance		Actual Performance		Perceptual Score		Gap Correlation
			X	σ	X	σ	X	σ	
System Quality $\lambda=0.7601$ KMO=0.76	X6	0.771	4.08	1.09	3.30	0.89	-0.78	1.12	0.133
	X11	0.754	3.72	1.02	3.17	0.97	-0.54	1.17	0.287*
	X14	0.716	3.93	0.94	3.18	1.06	-0.75	1.27	0.482*
	X10	0.642	4.33	0.83	3.24	1.02	-1.09	1.25	0.305*
	X15	0.642	4.19	0.88	3.57	1.02	-0.62	1.00	0.259*
	X2	0.590	3.60	1.30	2.50	1.24	-1.10	1.55	0.097
Information Quality $\lambda=0.7125$ KMO=0.72	X13	0.904	4.33	0.94	3.41	0.94	-0.92	1.22	0.063
	X4	0.880	4.19	0.99	3.30	1.04	-0.89	1.07	0.194**
	X5	0.607	3.48	1.06	3.09	1.03	-0.39	1.21	0.267*
Service Quality $\lambda=0.6622$ KMO=0.63	X1	0.835	4.03	1.09	3.11	0.88	-0.92	1.28	0.092
	X8	0.771	4.21	0.85	3.21	0.96	-1.00	1.26	0.219**
	X12	0.729	3.77	1.05	2.56	0.97	-1.20	1.40	0.117
Work performance quality $\lambda=0.8504$ KMO=0.76	X9	0.813	4.10	0.94	3.35	1.08	-0.75	1.25	0.201**
	X17	0.791	3.74	0.96	2.86	1.08	-0.87	1.27	0.267*
	X16	0.776	3.60	1.10	2.81	0.94	-0.80	1.29	0.173
	X3	0.758	3.90	0.94	2.95	0.99	-0.95	1.21	0.138
	X7	0.708	3.95	0.97	2.95	0.86	-1.00	1.16	0.142
	X18	0.696	4.11	0.96	3.46	1.06	-0.65	1.09	0.371*

Where * $\rho \leq 0.05$ and ** $\rho \leq 0.01$