A Study on the Supply Chain of E-commerce Transaction in the Banking Industry

Liang-Chyau Sheu[1], Pen-Hsi Liou [2]

1. Department of Technology Management, Chung Hua University, Hsinchu City, Chinese Taipei

2. Department of Technology Management, Chung Hua University, Hsinchu City, Chinese Taipei

1. lcsheu@chu.edu.tw , 2. d09703018@chu.edu.tw

Abstract: As the Internet continues to develop rapidly, the applications of e-commerce extend to an ever wider range. Yet, in the smaller scale supply chain system, small-and-medium enterprises (SMEs) are limited by talents, funds, techniques, etc, and feel insecure in regard to online fraud cases. These shortcomings comprise the major obstacles for SMEs fully participating in e-commerce. The transactions of raw materials and merchandise usually involve a huge amount of money. If one side of the buyer/seller relationship violates the contract or causes a dispute, it could entail a substantial loss of funds, flow failure and low efficiency. This study aimed to provide SMEs with an e-commerce platform through the unique role played by banks in regard to financial intermediation and fund saving, so as to help SMEs to develop a safe, fast and fair environment for capital flow as well as transparent data. We confirmed the relevant problems through a literature review and conducted surveys on suppliers and purchasers. With the help of Analytical Hierarchy Process (AHP) analysis, we determined the most valuable factor for companies engaging in e-commerce, proposed solutions and provided plans for the banking industry concerning an appropriate e-commerce platform.

Keywords: e-commerce; supply chain; analytical hierarchy process

1 Introduction

With the borderless features of globalization and information transmission, industries are actively devoting their efforts to penetrating the field of e-commerce. The ordering, production and sale of raw materials as well as determining how funds and merchandise can be transferred safely and stably before receiving the capital are the keys to a transaction's success and failure. Buyers worry that uncompleted shipments of ordered goods, a shortage of goods, incompatible merchandise, or disputes over defective merchandise, etc. Meanwhile sellers fear about unpaid shipment of goods, delayed payment, complaints of merchandise incompatibility, or disputes over defective merchandise. These constitute negative factors impacting the transactions of supply chain companies and as yet, there is no proper processing mechanism. Therefore, buyers and sellers must rely on experience in order to judge the transaction risks. This has an adverse effect on the development of the industry.

Therefore, this study aimed to adopt banking industry's abundant funds and talents, as well as its unique role as intermediary to construct an e-commerce platform. It also aimed to provide solutions to determine the weight or the sequential order for values of the e-commerce platform that concern enterprises the most, such that to provide a safe, fast, and fair e-commerce platform to benefit buyers, sellers and banks.

2 Literature Review

A company's supply chain contains geographically dispersed facilities where raw with materials, intermediate products, or finished products are acquired, transformed, stored, or sold and transportation links that connect facilities along which products flow[1].

Scholars have offered different definitions of e-commerce. Bloch, Pigneur and Segev[2] state that e-commerce is meant to support enterprises in regard to business transactions through the medium of electronic devices. Turban et al[3]. consider that e-commerce is a kind of transaction or exchange of products, services or data through the Internet.

Companies that provide a transaction platform can be divided as: (1) Seller oriented; (2) Buyer Oriented; (3) Intermediary oriented[4]. If an enterprise can serve as a Third-Party Platform provider [5], it can not only provide an external interface for communications, but can also play a role in communication and coordination.

3 Methodology

The proposed methodology of this work includes the followings.

3.1 Outlining the Problems, Factors for Decision Making, and Building up the Framework

By interviewing experts and analyzing the group decision-making process, four fundamental concerns for assessing e-commerce transactions in the financial industry was found: transaction safety, transaction convenience, transaction cost, and data safety. The supply chain companies' major concerns include: (1) Identifying the platform provider: the transaction information is strictly confidential in the industry, and the platform provider must have a certain level of credibility and exercise self-discipline to avoid the outflow of information. (2) Providing data for buyers and sellers' transaction capability: sellers need to know buyers' purchasing capacity from the platform and offer relevant information regarding the products; buyers need to access quotations of the products, place their orders and be reassured that the quantity of the merchandise is sufficient. (3) Confirming the transaction deadline: signifies the deadline for buyers to examine the merchandise. (4) Dealing with contract violations: sellers' violations include: (a) non-delivery after receiving money; (b) supplying defective goods; and (c) inconsistent level or quantity of goods. Buyers' violations include: (a) refusing to pay after receiving goods; (b) refusing or delaying to sign when goods delivered; and (c) disputes over defective goods. (5) Instant information response: obtaining instant messages related to the transaction process on the platform, including instant enquiries on quotations. (6) Fund transfers: the methods used for transferring funds and other problem-related payments. (7) Merchandise specifications: providing catalogs, standards and prices of merchandise. (8) Construction cost: the cost of constructing an e-commerce platform. (9) Operation cost: the cost to companies for using and maintaining an e-commerce platform. (10) Providing online identity verification: identifying and confirming the identity of buyers, sellers and senders. (11) Ensuring complete data transmission: ensuring that data transmission will not be stolen or maliciously tampered with while data is processed. (12) Precluding denial of transactions: preservation of both sides' data. (13) Protecting data privacy: preventing the transaction data from being revealed to unauthorized parties. Finally, a framework for an e-commerce platform was built up, as shown in Table 1.

Table 1: E-commerce transactions platform

Means Objective level 1	Criteria level 2
Transaction Safety (O1)	(1) Identifying the platform provider (O1C1)
	(2) Providing the information about the buyers and sellers' capabilities (O1C2)
	(3) Confirming the transaction deadline (O1C3)
	(4) Processing the violation of transactions(O1C4)
Transaction Convenience (O2)	(5) Instant information response(O2C1)
	(6) Fund transferring (O2C2)
	(7) Transparency concerning product catalogue(O2C3)
Transaction Cost(O3)	(8) Construction cost(O3C1)
	(9) Operation cost(O3C2)
Data safety (O4)	(10) Providing online identity verification(O4C1)
	(11) Assuring complete data Transmission(O4C2)
	(12) Precluding denial of transaction(O4C3)
	(13) Protecting data privacy(O4C4)

3.2 Survey Statistics

This study aimed to review the relations between buying and selling among the companies by examining both suppliers and buyers. There were 10 valid samples collected from suppliers and buyers, respectively. The data and statistics were calculated by the geometric mean and the group decision aggregation model.

3.3 Relative weighting

The AHP was used to determine the relative importance of the criteria. The main steps of the AHP are as follows.

3.3.1 Perform pairwise comparisons(suppliers)

Based on the comparisons between the different suppliers, the surveys collected in the study were analyzed in Tables 2~ 6.

Table 2:Pairwise comparisons matrix of the first level criteria (platform)

e-commerce platform	O1	O2	O3	O4
O1	1	1.196	0.860	0.509
O2		1	0.315	0.728
O3			1	1.072
O4				1

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Table 3:Pairwise comparisons matrix of the second level criteria(O1)

transaction safety(O1)	O1C1	O1C2	O1C3	O1C4
O1C1	1	1.282	3.442	3.689
O1C2		1	6.249	5.909
O1C3			1	1.835
O1C4				1

Table 4:Pairwise comparisons matrix of the second level criteria(O2)

transaction convenience(O2)	O2C1	O2C2	O2C3
O2C1	1	0.533	0.728
O2C2		1	1.149
O2C3			1

Table 5:Pairwise comparisons matrix of the second level criteria(O3)

transaction cost(O3)	O3C1	O3C2
O3C1	1	0.509
O3C2		1

Table 6:Pairwise comparisons matrix of the second level criteria(O4)

Data safety(O4)	O4C1	O4C2	O4C3	O4C4
O4C1	1	1	1.311	0.803
O4C2		1	1	0.896
O4C3			1	1
O4C4				1

3.3.2 Computing the relative weights (suppliers)

From the standardized relative weights of suppliers in Table 7, the suppliers' primary concerning factors in the first level can be derived in the following order: (1) transaction cost; (2) data safety; (3) transaction safety; and (4) transaction convenience.

Table 7: Relative weights of criteria (suppliers)

e-commerce platform (suppliers)	Criteria	A first level	B second level	A*B Relative weights
transaction safety (O1)	O1C1	0.202	0.380	0.077
	OlC2	0.202	0.437	0.088
	O1C3	0.202	0.105	0.021
	O1C4	0.202	0.077	0.016
Transaction Conven-ience(O2)	O2C1	0.160	0.237	0.038
	O2C2	0.160	0.419	0.067
	O2C3	0.160	0.344	0.055
transaction cost(O3)	O3C1	0.338	0.337	0.114
	O3C2	0.338	0.663	0.224
Data Safety (O4)	O4C1	0.301	0.253	0.076
	O4C2	0.301	0.242	0.073
	O4C3	0.301	0.234	0.070
	O4C4	0.301	0.271	0.081

If viewed from the perspective of the relative weights of suppliers, the top 50% of the factors of concern to the suppliers include: operation cost, construction cost, providing data for buyers and seller's transaction capabilities, assuring data privacy, providing online identify verification, assuring complete data transmission, etc. From the suppliers' end, the weights for operation cost and deconstruction cost are higher than they are for other factors. The key issue for the banking industry is overcoming the extra costs derived from the construction of the e-commerce platform.

3.3.3 Perform pairwise comparisons (buyers)

Based on the comparisons between the buyers, the surveys collected in the present study were analyzed in Tables 8~ 12.

Table 8:Pairwise comparisons matrix of the first level criteria (platform)

e-commerce platform	O1	O2	O3	O4
O1	1	3.728	1.835	1.072
O2		1	0.515	0.351
O3			1	0.475
O4				1

Table 9:Pairwise comparisons matrix of the second level criteria(O1)

Transaction safety(O1)	O1C1	O1C2	O1C3	O1C4
O1C1	1	1.661	3.402	1.282
O1C2		1	2.734	1.888
O1C3			1	0.552
O1C4				1

Table 10:Pairwise comparisons matrix of the second level criteria(O2)

transaction convenience(O2)	O2C1	O2C2	O2C3
O2C1	1	2.325	0.475
O2C2		1	0.299
O2C3			1

Table 11:Pairwise comparisons matrix of the second level criteria(O3)

transaction cost(O3)	O3C1	O3C2
O3C1	1	0.933
O3C2		1

Table 12:Pairwise comparisons matrix of the second level criteria(O4)

Data safety(O4)	O4C1	O4C2	O4C3	O4C4
O4C1	1	1.282	1	1
O4C2		1	0.896	1
O4C3			1	1.116
O4C4				1

3.3.4 Computing the relative weights (buyers)

From the standardized relative weights of the buyers in Table 13, the primary factors of concern to the buyers in the first level can be derived in the following order: (1)

transaction safety; (2) data safety; (3) transaction cost; and (4) transaction convenience.

If viewed from the perspective of standardized weights, the top 50% of the factors of concern to the suppliers are providing the identity for the platform supplier, providing data for buyers and sellers' transaction capabilities, operation cost, providing online identify verification, construction cost, precluding denial of transactions, and ensuring data privacy. This indicates that the banking sector's primary tasks are to support the identity of the platform suppliers on the e-commerce platform and to provide real-time information on the transaction capability from both the selling and buying sides on the e-commerce platform.

Table 13: Relative weights of criteria (buyers)

e-commerce platform (buyers)	Criteria	A first level	B second level	A*B Relative weights
transaction safety (O1)	O1C1	0.365	0.373	0.136
	OlC2	0.365	0.303	0.111
	O1C3	0.365	0.110	0.040
	O1C4	0.365	0.214	0.078
Transaction Convenience(O2)	O2C1	0.105	0.300	0.031
	O2C2	0.105	0.147	0.015
	O2C3	0.105	0.554	0.058
transaction cost(O3)	O3C1	0.187	0.483	0.090
	O3C2	0.187	0.517	0.097
Data Safety (O4)	O4C1	0.343	0.266	0.091
	O4C2	0.343	0.228	0.078
	O4C3	0.343	0.263	0.090
	O4C4	0.343	0.243	0.083

The C.R. (Consistency Ration) of all factors related to suppliers and buyers' sides was calculated. All C.R. ratios are smaller than 0.1, which indicates that the deviations to all relative weighting criteria fall within the acceptable range. In other words, the pairwise comparison criteria of all of the factors and at all levels are consistent.

3.4 Solutions

According to the results shown in Table 7 and 13, the priorities and differences of suppliers in the supply chain are understood. The solutions proposed are as the follows:

1. The e-commerce platform is to be built by the banking industry, enabling cooperating enterprises to demonstrate their online catalogues on the platform. The buyers can browse, inquire, arrange trading terms. Participating enterprises should apply for an electronic ID, which provides protection of the transaction information and identity verification, and prevents invalid trading.
2. Buyers can broadcast purchasing information on the platform. After receiving the confirmation and response from the supplier, the buyer can deposit the installment in the deposit reserve account arranged by the bank and inform the supplier. In this phase, in case of insufficient funds, buyers with loan arrangement and unused credit with the bank can apply for an e-financing on the platform in real time.
3. The supplier can verify the deposit reserve account on the platform. After verification, the goods can be shipped and the delivery information can be forwarded to the buyer.
4. The buyer can inform the bank to release the deposit reserve on the transaction platform after the delivery and examination of the goods in the agreed upon period.
5. The bank transfers the fund after receiving the message from the buyer to transfer the money. The funds will then be released from the deposit reserve provided by the bank and transferred directly to the supplier's account. The generic transaction cycle is now accomplished.
6. In case of disputes, such as flawed goods, as the fund is secured in the deposit reserve, the buyer and suppler can settle the issue via negotiation, arbitration or legal actions to determine the ownership of the fund so that trading violations can be greatly reduced.

4 Conclusions

An e-commerce platform, whether it is constructed by the buyer or the seller, will not be desirable enough in terms of the fairness in trading as the roles of the two parties are different, thereby causing varied emphasis on

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the functions of the platform and discrepancy of the information provided. This study aimed to offer an e-commerce platform based on banking industry for the supply chain to have an e-commerce environment that is safe, ensures consistent transaction information, as well as provides efficient and convenient services.

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