E-Supply Chain integration adoption: Examination of buyer-supplier relationships

Abstract

The purpose of this study is to empirically examine the adoption of e-supply chain integration by electrical and electronic industry suppliers. This study has integrated both the transaction cost and resource dependence models in understanding the influence of buyer-seller relationships on e-supply chain integration. Hypotheses were developed based on the proposed model. Data were collected from 122 electrical and electronic suppliers located in Malaysia. The data was examined using multiple regression analysis. The results showed that Asset Specificity, Product Technological Uncertainty, Transaction frequency, Proportion of sales to e-supply chain integration promoter, and number of customers are able to explain suppliers' decisions to adopt e-supply chain integrations with their buyers. Buyers that would like to improve the adoptions of e-supply chain integration will be able to formulate and plan strategies from the buyer-seller relationships perspectives.

Keywords: E-supply chain integration, transaction cost theory, resource dependence theory, buyer-supplier relationships

Introduction

Organizations today operate in an extremely competitive business environment driven by the emphasis on time and quality based competition, market uncertainties, and globalisation. In respond to the competitive environment, many organizations started to have multi-sites production networks in order to reduce costs [10]. Due to the multi-sites productions, integration in supply chains becomes important for organizations. As Frohlich [18] stated, one of the most admired organizations are those that have a tightly integrated, collaborative supply chain. Although the concept of supply chain integration has long existed, it is only due to the recent emergence of web technologies which ensure that supply chain integration can be achieved easily and practically [4]. Prior to the emergence of web technologies, organizations relied heavily on technology such as Electronic Data Interchange (EDI) to integrate their supply chain [33]. However, EDI has several limitations such as the lack of consistent standard (e.g. Europe and Japan used a different EDI standard), high costs, and only transmitting data in batches. The Internet has solved many of the EDI implementation problems faced by organizations. The integrations between an organization and its upstream suppliers and downstream customers is known as e-supply chain integration [2].

E-supply chain integration enable organizations to share real time information seamlessly, improve productivity, increase efficiency, improve the ability of the supply-chain to deliver faster and better products/services, improve the balance between supply and demand, and reduce the cost through better coordination and information sharing, and reduce the risks of bullwhip effects ([26]; [19]; [27]). Despite the reported benefits of e-supply chain integrations [33], there remained some important questions that are unanswered in practice in terms of successfully implementing e-supply chain integrations [6]. Researches on e-technologies from the operations management (OM) perspective is so far scant as well [14]. Past studies found that technological and organizational factors such as the cost of e-supply chain integrations, concerns with security issues, and organization size to be some of the barriers to the successful implementations towards e-supply chain integrations ([18]; [23]). Others have applied the Diffusion of Innovation model to understand e-supply chain integration implementations [31]. However, recent study by Chong et al. [12] stated that issues related technological and organizational factors have less influence on e-supply chain integration due to the maturity of internet supply chain technologies. For example, e-business standards such as ebXML and RosettaNet are able to solved issues related to compatibility and costs. Furthermore, the long term benefit of e-supply chain integrations outweighs the initial investments required. Instead, researchers are now suggesting that interorganizational relationships could play a more important role in e-supply chain integrations when compared to traditional technological and organizational factors.

In studying interorganizational relationships in the context of supply chain, the buyer-supplier relationships have often been examined by past literatures ([3]; [12]; [36]). The implementation of past supply chain systems such as EDI have often been dominated by buyer push [24], whereby the buyers often pressure their suppliers to adopt EDI [24]. Although e-supply chain integrations involved using the Internet as the communication medium, a firm's implementation decisions is likely to be influenced by buyer-supplier relations. Nevertheless, it is now shown that firms which use power to influence their suppliers to adopt technology might not be successful all the time, such as in the case of Wal-Mart's implementation of Radio Frequency Identification (RFID) [16]. Therefore there is a need to analyze the buyer-supplier relationships from different perspectives to understand why suppliers are willing or not willing to adopt e-supply chain integration. Two of the most common theories that have been applied to study buyer-supplier relationships is the transaction cost theory and resource dependence theory [24]. This study aims to integrate both transaction cost theory and resource dependence theory to provide a unified framework to examining the implementation of e-supply chain integration. The unified model will provide insights into the buyer-supplier relationships' influence on suppliers' decisions to implement e-supply chain integration. This paper will proceed by providing a review of literature and the development of hypotheses. This is followed by an empirical testing of these hypotheses by using data from first and second tier electrical and electronic suppliers in Malaysia. Lastly, the paper concludes with discussions, implications, and limitations of the study.

Literature Review

E-supply chain integration

Problems due to poorly coordinated and non integrated supply chain have been well documented in past literatures [18]. A poorly integrated supply chain will result in the Bullwhip Effect, whereby the orders to the suppliers have larger variance then the buyers' sales, and this demand distortion propagates upstream in an amplified form [27]. Due to the instability in planning which is magnified backwards up to the supply chain [27], it becomes vital to control error amplified from the downstream customers to the upstream suppliers. One way to reduce the Bullwhip Effect is to balance the supply and demand across the supply chain, and this requires an integrated flow of data between the suppliers and buyers ([18]; [7]).

The integration of data flow can be achieved by implementing appropriate supply chain information systems [12]. However, the Internet is not the first electronic link. Prior to the Internet, firms seek to integrate their supply chain through Electronic Data Interchange (EDI) on Value Added Network (VAN). However, there are some limitations of EDI on VAN such as processing information in batches, slow evolution in standard, expensive, and difficulties in implementation ([20]; [11]). The Internet has enabled good integrations between suppliers and customers for inventory planning, demand forecasting, joint designs, order replenishments, and customer relationships [20]. Despite the benefits of e-supply chain integrations, there remain barriers in their implementations [23]. Some of the reasons for the barrier include the reluctance to share important supply chain information between suppliers and buyers [15]. It is therefore important to investigate what are factors that can influence the buyer-supplier relationships such that there is a successful implementation of e-supply chain integration.

Transaction Cost Theory

Past studies examining customer-supplier relationships have frequently applied the transaction cost theory in order to explain the relationship governance decisions [1]. According to the transaction cost theory, the market governances are inefficient and fail when exchanges occur in an environment which has high level of uncertainty and small number of potential partners, whereby the competitive forces are unable to control supplier opportunism ([17]; [34]). Transaction cost theory also states that for firms, the transaction costs involved in managing relationships and interactions with the potential suppliers such as searching, negotiating and monitoring execution of the transactions are significantly economic valuable [8]. The implementations of e-supply chain integrations will be able to reduce the governance costs of transactions with external parties relative to the internal coordination costs [32].

The three exchange attributes that have often being used by researchers in transaction cost theory are asset specificity, uncertainty, and exchange frequency ([8]; [17]; [24]). Past studies have attempted to apply the attributes in their study on IT systems in the supply chain such as EDI ([24]; [29]), e-collaboration tools [12], and e-procurement [25]. However, these studies have not considered all aspects of the three attributes together and apply them to understand the implementation decisions of e-supply chain integration. Empirical studies applying transaction cost theory to understand the adoptions of web based supply chain systems still remained sparse [35].

Resource Dependence Theory

According to resource dependence theory, organizations depend on others in their environment for resources in order to ensure their on-going viability [30]. Therefore in an uncertain environment where dependencies increase, firms will form closer relationships in order to improve "information exchanges, commitment, legitimacy, and exchange stability" [17]. Therefore, a primary concern that is addressed by resource dependence theory is the interchange of resources between trading partners in order to manage the uncertainty in environment. As Chong and Ooi [11] stated, "firms that lack essential resources will seek to establish relationships with other organizations in order to obtain the needed resources". In Chong and Ooi [11]'s study, they found that firms will respond to demands of firms whose resources they are heavily dependent on, and this has led to firms with stronger partner power are able to request their trading partner to adopt e-business standards.

In the study of customer-supplier relationships, resource dependence theory has often being applied, and attributes such as the number of suppliers/buyers in the market, the number of competitions, the dependence on buyers/suppliers have being studied. Resource dependence theory has been studied in the adoption of supply chain technologies such as EDI and e-commerce ([24]; [21]). Supply chain and supply chain information systems is characterized by high uncertainty due to the "dynamic market structures and total information visibility" [21], thus the application of resource dependence theory is appropriate to examine the interorganizational relationship management between suppliers and buyers.

In summary, this research aims to integrate both theories from transaction cost theory and resource dependence theory to provide a unified framework to examine the impact of buyer-suppliers' relationships on e-supply chain integrations.

Hypotheses development and Research Model

Transaction cost theory emphasized on a firm's dependence on their external trading partners. Based on the theory, firms will invest in non-recoverable asset specific investments needed in order to support interorganizational exchanges ([34]; [17]). In the context of this research, we refers the interorganizational exchanges as the implementation of e-supply chain integrations. This is supported by Iskandar et al. [24]'s study on EDI implementation, which stated that the investments in specific assets needed for exchange is one of the main dimensions of transaction cost theory. In order to measure this attribute, we adopted Fink et al. [17]'s approach of measuring asset specificity in terms of the non-recoverable investments made by the firm to support interorganizational relationships. Therefore this research examine the organizational dependence by asset specificity, and hypothesizes that:

Hypothesis 1: The greater the asset specificity a supplier has with a buyer that promotes e-supply chain integration, the more likely a supplier is to adopt e-supply chain integration.

Another important element in transaction cost theory is the uncertainty embedded in the exchange process [24], or the environmental uncertainty. The uncertainties in the environment mean that firms will have higher risk level. Studies from Chong et al. [12] and Chong and Ooi [11] have investigated the impact on environmental uncertainties on firms' decisions to implement e-business in their supply chain. Environmental uncertainties can be caused by product technological uncertainty [17]. Product technological uncertainty could be due to the technical aspects of the products' future changes, the inability to forecast the requirements and changes, and products that are complicated and require customization. Chong et al. [12] and Chang [8] stated that products that are complicated to build will often require customization, and to meet the requirements of specific customers. The demand for these products is very likely to fluctuate, thus increasing the uncertainty. Fink et al. [17] stated that governance is a way to ameliorate the risks caused by product technological uncertainty. Iskandar et al. [24] stated that a supplier is more willing to adopt EDI if there is a high degree of product customization due to high switching costs. Chong et al. [12] also supported that product complexity is able to influence a firm' decision to adopt supply chain information systems. In this study, the products studied are electrical and electronic products such as semiconductor chips. In these products' environment, innovations occur quickly (e.g. based on Moore's Law), and suppliers bear risks as many products may be obsolete quickly and therefore they need to have an efficient management of their supply chain. Hence we hypothesize that:

Hypothesis 2: The greater the product technological uncertainty a supplier has with a buyer that promotes e-supply chain integration, the more likely a supplier is to adopt e-supply chain integration.

According to Iskandar et al. [24], products with high transaction frequency shows the importance of the suppliers' products/services for the buyers' operation process, Firms are more likely to improve their interorganizational relationships and coordination with trading partners who have frequent transactions ([24]; [8]). In a high frequency transaction environment, firms are more willing to implement e-supply chain integration as they are likely to enjoy higher benefits, especially to the buyers ([24]; [12]). On the other hand, low transaction frequencies products are viewed as having fewer values to firms, and they are less likely to connect with their suppliers by having a fixed information system ([12]; [8]). E-supply chain integrations are able to reduce transaction costs since they are able to improve the process of buyer-supplier coordination [24]. Therefore the following hypothesis is formulated:

Hypothesis 3: The higher the frequency a supplier has with a buyer that promotes e-supply chain integration, the more likely a supplier is to adopt e-supply chain integration.

Based on resource dependence theory, firms are constrained by their dependencies on the environment. Firms with higher partner power are able to use this as an advantage and exploit their situations to secure the necessary resources [24]. Therefore firms with higher partner power are able to control their partners that have resources that they need ([24]; [11]). The opportunity that a firm has to sell its products is considered as a resource [24]. Therefore a supplier which has high percentage of sales to a buyer means that that buyer has a power advantage over them. This in turn would mean that the buyer which has higher power advantage are able to influence the supplier's decision to implement e-supply chain integration. This is proposed by past literatures such as Iskandar et al. [24] and Chong and Ooi [11]. The following hypothesis is therefore developed:

Hypothesis 4: The greater proportion that a supplier sells to a buyer that promotes e-supply chain integration, the more likely a supplier is to adopt e-supply chain integration.

Based on resource-dependence theory, if a firm has more buyers, the buyer will need to put in more efforts to promote e-supply chain integration to its suppliers. In the context of supplier, the buyer will have less strength to convince its suppliers to adopt e-supply chain integration as the buyer will have less organizational resources to promote e-supply chain integration [24]. This is supported by the findings from Chong [9]'s case study on a large semiconductor firm, who found it difficult to convince its 500 plus suppliers to adopt e-business. However, it should be noted that the view of resource-dependence theory is slightly in conflict with the transaction cost theory in this aspect. If based on the transaction cost theory, since there are many suppliers, the buyer will seeks to reduce transaction costs by promoting e-supply chain integration. However, given that the aim of this research is to integrate and examine the two relevant theories, and the concept of power advantages is an important concept to resource dependence theory, the hypothesis was made consistent with resource dependence theory:

Hypothesis 5: The greater the number of competitors a supplier has, the less likely a supplier is to adopt e-supply chain integration.

A firm will try to reduce their dependence on another firm in order to maintain their needed resources ([24]; [28]). A supplier will therefore seek to have more buyers instead of relying on one or selected groups, in order to reduce their dependence on the buyers, and therefore reducing the power of the buyer. Therefore a firm will be able to reject its buyer's request of implementing e-supply chain integration if they have other customers who do not demand them to implement the technology. Accordingly, we hypothesize that:

Hypothesis 6: The greater the number of customers a supplier has, the less likely a supplier is to adopt e-supply chain integration.

Based on the hypotheses developed, a research model is developed. Figure 1 provides an overview of the research model.

<<Figure 1 about here>>

Research Method

This study used questionnaire for collecting data to examine the research model and test the hypotheses proposed. The unit of this study is electrical and electronics suppliers in Malaysia. As suggested by Iskandar et al. [24], a simple mailing without reference would end up with unsatisfactory response rate. Therefore we adopted the same approach by Iskandar et al. [24], and conducted the project under the auspices of five major electrical and electronics manufacturing firms in Malaysia. These five firms are multinationals, well established, and are among the leaders in their industry. As the firms requested that they remained anonymous, their names were not revealed in this research. Representatives from the firms' logistic department worked closely with us in refining the survey and distributing the survey. A pilot study was conducted with five managers and assistant managers of logistic and IT departments in two semiconductor firms and telecommunication firms. The manager and assistant managers gave minor feedbacks for us to change some of the wordings of the questionnaire.

The questionnaires were distributed to 523 suppliers. The questionnaires were emailed to the managers or senior executives of the IT or logistic departments of the firms. If the managers or senior executives were not available, we requested the firm to nominate the most appropriate personnel to answer the survey. Four weeks after emailing the survey, the relevant personnel of the five manufacturing firms helped us to send a reminder to suppliers who have not reply the surveys. Four weeks after the email reminder, we made personal calls to suppliers who have not reply to our survey. In total, the data collection process took three months.

Out of the 523 suppliers, we managed to receive 122 usable, completed questionnaires, giving us a response rate of 23 percent. Table 1 provides a summary of the demographic profiles of the firms.

<<Table 1 about here>>

Measurement

Dependent variable

In order the measure the adoption of e-supply chain integration, we adopted the measurement items from Frohlich [18]. The adoption is measured in terms of the extent to which the firm implemented web-based processes with their suppliers and customers. For supplier e-supply chain integration, we asked if they have implemented web-based processes for 1) procurement of materials, 2) integrated order scheduling and tracking, 3) integrated inventory planning, and 4) integrated demand/forecasting. For customer e-supply chain integration, we asked if they have implemented the following web-based processes with their customers 1) targeted marketing/customer profiling, 2) online order taking/receipt, 3) after sales service/support, and 4) integrated demand forecasting. A 7 point scale ranging from 1 = No at all to 7 = Fully were used to measure the items.

Independent variables

There are six independent variables that were proposed in the research model – asset specificity, product technological uncertainty, transaction frequency, proportion of sales to e-supply chain integration promoter, number of competitors, and number of suppliers. The measurement items for these variables were adopted from Iskandar et al. [24] and Fink et al. [17]. Appendix 1 provides a summary of the measurement items.

Scale reliability and Factor analysis

In order to test the reliability and validity of the constructs, Cronbach's alpha and factor analyses were applied. Reliability and factor analyses were performed only on independent variables which have more than one items, and in this study, they are asset specificity and product technological uncertainty.

<<Table 2 about here>>

The reliability coefficients (α) of each both constructs were more than 0.70, therefore the constructs are considered as reliable [22]. . Since the factor loadings all greater than 0.5, no items were deleted in measuring the constructs.

Multiple Regression Analysis

Since this study aims to investigate the relationships between the six constructs proposed from the transaction cost and resource dependence theories with e-supply chain integration adoption, multiple regression analysis was applied. As the skewness and kurtosis of our dependent variable is between the range of -0.84 and 0.19, the condition for normality of the dependent variable is met. Figure 2 and Table 3 provides the results from multiple regression analysis.

Based on Table 3, all the constructs' tolerance is greater than 0.1, while the variation inflation factors (VIF) are less than 10, thus confirming that the data do not have multicollinearity issues. The F-value 150.60 and is statistically significant at the $p < 0.05$ level, thus confirming the fitness of the model. The R^2 value is 0.78, thus suggesting that the independent variables are able to explain 78% of the variance of e-supply chain integration adoption. The results show that Asset Specificity, Product Technological Uncertainty, Transaction frequency, Proportion of sales to e-supply chain integration promoter, and number of customers are all significant at $p < 0.05$. Therefore Hypothesis 1, 2,3,4 and 6 are supported. Number of competitors has a p value of greater than 0.05, therefore Hypothesis 5 is rejected. In terms of the importance of the independent variables, the β values of the variables show that asset specificity is the most important variable that influence the adoption of e-supply chain integration, followed by transaction frequency, product technological uncertainty, proportion of sales to e-supply chain integration provider, and number of customers.

<<Figure 2 about here>>

<<Table 3 about here>>

Discussions

Based on Table 3, five of the six hypotheses were supported, showing that the unified model is able to explain e-supply chain integration adoption decisions well. The results suggest that variables from the transaction cost theory played a major influence in firms' e-supply chain integration adoption. Asset specificity is the most important variable in terms of its influence on adoption decision. This means that when firms have invested in assets which required for exchanges with their trading partners, they will have higher incentive to maintain the relationship. One way which the supplier can maintain and safeguard the relationship with their customers is by implementing e-supply chain integration. Once the supplier has adopted e-supply chain integration with their buyers, they will be able to minimize the risks of their buyers' opportunistic behaviour of finding other suppliers. This is especially when the investments made in e-supply chain integration is mostly for long term, as it involves training of staffs, learning about each others' products and procedures, and even tailoring their business systems and processes in accordance with their buyers' needs.

Similar to studies conducted by Chong et al. [12] and Fink et al. [17], the product technological uncertainty is also an important variable that explain suppliers' adoption of e-supply chain integration. If products have high technological uncertainty and require lots of customizations, the risks for the suppliers are much higher. In order to minimize the risks, suppliers can again secure their relationships with buyers by implementing e-supply chain integrations. Furthermore, the transaction costs will also be reduced for the suppliers for products with uncertainty if the suppliers implement the technology, as it will be difficult for them to seek for new buyers if their products have high uncertainty. Therefore the suppliers have higher dependence on their buyers.

Transaction frequency of the products was found to be statistically significant in the decisions to adopt e-supply chain integrations in the electrical and electronics suppliers. The reasons for this can be supported by the findings from Iskandar et al. [24] who stated that the suppliers view the investments in e-supply chain integration as low risk since they are conducting transactions frequently with their suppliers. Chong et al. [12] supported this as they mentioned that high frequency transaction products will have high business value to a firm, and therefore the firm is more likely to share information with its supply chain partners by implementing IT to integrate their supply chain processes. Lastly, the "buyer push" will also be strengthened from the perspectives of suppliers for high frequency products [24].

The proportion of sales to e-supply chain integration promoter is derived from the resource dependence theory. The results support the hypothesis whereby suppliers who have higher percentage of sales to e-supply chain integration promoters, the higher dependence they are to their buyers. Therefore although it is in the interest of the buyers to implement e-supply chain integration, but because they have higher partner power advantage over the suppliers, the suppliers have less bargaining power to resist the adoption of e-supply chain integration. This is supported by findings from Iskandar et al. [24] on their studies on EDI adoption., and support the fact that e-supply chain integration is governed by buyer-supplier power relation [24].

Surprisingly, our findings found that there is no statistical significance between number of competitors of a supplier and its decisions to adopt e-supply chain integration. As stated earlier, hypothesis five is actually in contradiction with the transaction cost theory, since resource dependence theory hypothesizes a negative relationship with e-supply chain integration, while transaction cost theory will result in positive relationships with e-supply chain integration. Nevertheless, the lack of statistical significance shows this construct does not significantly influence e-supply chain integration in the context of either theory. This could be explained by the fact that suppliers still do not realize that e-supply chain integration can increase their competitiveness in the marketplace, and they only adopt e-supply chain integration due to "buyer push".

Lastly, the number of customers is found to have a significant and negative relationship with e-supply chain integration adoption. This means that when a supplier has many customers, it reduces the power of their buyer, and therefore they are able to choose not to adopt e-supply chain integration even though the buyers encouraged them to do so. In other word, the supplier is able to reduce their dependence on their buyers if there are more customers.

Conclusion, implications and limitations

This study has developed six hypotheses drawing from the transaction cost and resource-dependency theories to examine the factors influencing suppliers' e-supply chain integration adoption decisions. The findings supported the unified model which integrates from both theories applied. There are several important practical and theoretical implications of this research.

Buyers that would like to improve the adoptions of e-supply chain integration will be able to formulate and plan strategies from the buyer-seller relationships perspectives. In the past, many technology adoption studies have derived from models such as Diffusion of Innovation, Technology-Organization-Environment, and Technology Acceptance Model [11]. However, e-supply chain integration implementations involves the needs to share information, trusting each other, and forming interorganizational relationships, and therefore it is important that buyers understand the adoption decisions of suppliers from the buyer-supplier perspective. For buyers, they can plan to improve their adoption of e-supply chain integration by focusing on specific products which have high product uncertainty and high transaction frequencies. Suppliers are more likely to adopt e-supply chain integrations for these products. The partnership risks can also be reduced if buyers invest with suppliers in assets required for exchanges. This can involve trainings of employees, equipments, or even investing in e-business standards such as RosettaNet which is being heavily promoted in the electrical and electronic industry [5]. Buyers should also understand that power relationship can play an important role in influencing their suppliers to adopt e-supply chain integration. Therefore in the case when they have higher power advantage (e.g. suppliers have high percentage of product sales to them), they can use “buyer push” strategy to enforce the suppliers to adopt e-supply chain integration.

In terms of theoretical contributions, this study has integrated both the transaction cost and resource dependence models in understanding the influence of buyer-seller relationships on e-supply chain integration. Although past studies from Iskandar et al. [24] similarly integrated both models, their study was focused on EDI which has limitations such as costs, compatibility, and lack of standard issues. As web technologies have overcome these limitations, we are able to purely focus on the roles of buyer-seller relationships. Frohlich [18]’s study on e-supply chain integration also emphasized on the barriers of adoption, and did not examine the adoption factors from the unified theory. As discussed earlier in the results section, the variables from the model are able to explain a high percentage of the variance of e-supply chain integration adoption.

There are several limitations of this study. Firstly, the data collected from this study is from a self selection approach of collaborations with five electrical and electronic firms. Secondly, this study also focused on the electrical and electronic industry. Due to the difficulty in collecting data, we did not further collect data on the types of electrical and electronic products and whether different types of products will moderate some of the relationships proposed in our research model. Thus care should be taken when interpreting our result as it may not generalize to other industries and all products. Future studies can collect data from other industries to further confirm the model and results from this research. Lastly, this study only draws its variables from the transaction cost and resource dependence theories. Future research can consider other variables such as management support, organization size, and organization culture.

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Appendix

Construct	Indicators
Asset specificity	We have a significant investment in training and equipments dedicated to our relationships with our trading partner. Our systems have been tailored to using the particular items bought from our trading partner. Our company has unusual technological standards and norms that require extensive adaptation by our trading partner. We spend lots of time and effort to learn the unique product characteristics of our trading partner.
Product technological Uncertainty	There have been many product improvements in the past 2 years. There is a high probability of product improvement in the next 2 years. The product in our company is highly customized.
Transaction frequency	How often do you deliver your products to the e-supply chain integration promoting firm?
Proportion of sales to e-supply chain integration promoter	Approximately what percentage of sales your company sell to the e-supply chain integration promoter?
Number of competitors	Please provide an estimation of the number of direct competitors your company has.
Number of customers	Please provide an estimation of the number of customers your company has.

Figure 1 Conceptual Model

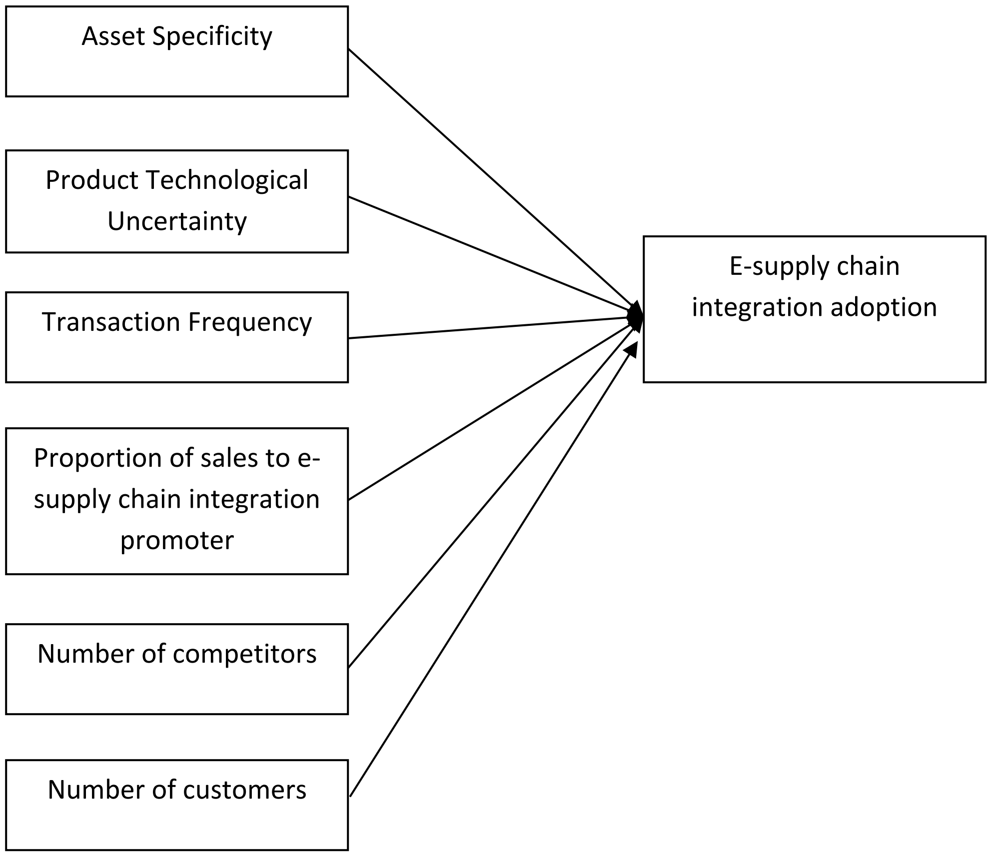

Figure 2 Results

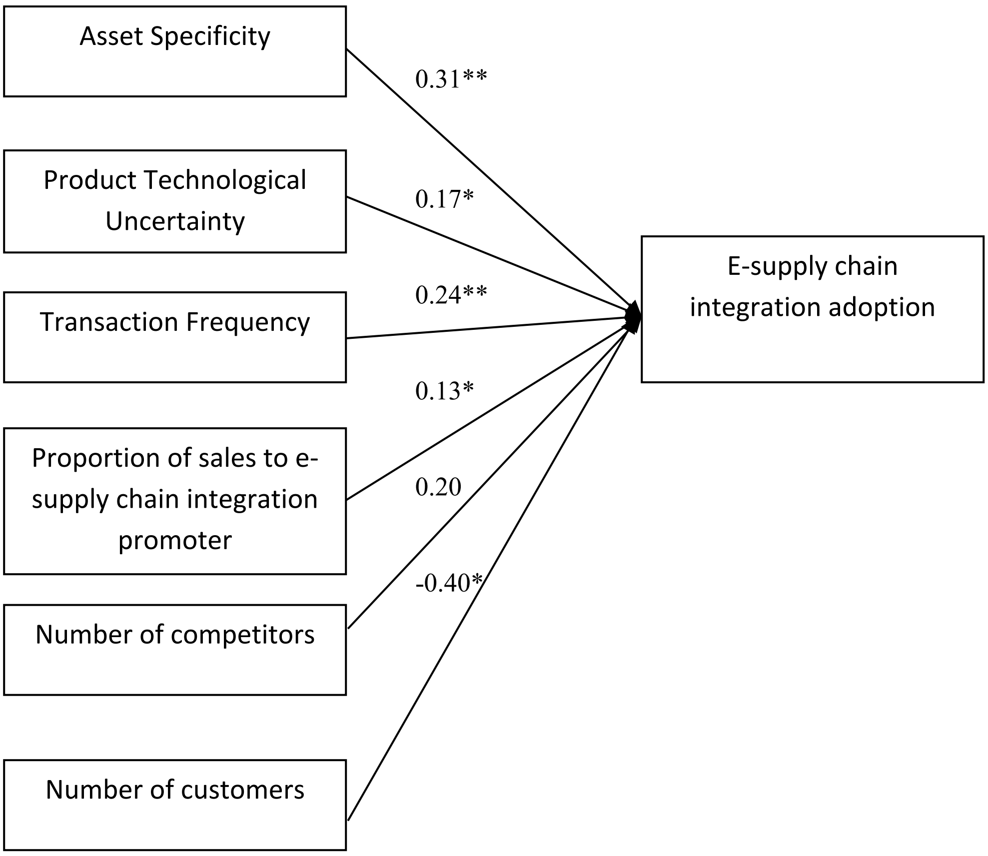

Table 1 Demographic summary

Profiles	Number	Percentage (%)
Employee Size		
Less than 5	8	6.56
5 and 50	30	24.59
51 – 150	49	40.16
More than 150	35	28.69
Annual Turnover		
Less than RM250,000	4	3.28
Between RM250,00 and RM 10 million	50	40.98
Between RM10 million and RM25 million	47	38.53
More than RM25 million	21	17.21
Types of firms		
Multinationals	37	30.33
Locals	67	54.92
Joint-ventures	18	14.75

Table 2 Reliability and Factor analyses

Constructs	Factor loading	KMO	Reliability
Asset Specificity	0.927 – 0.939	0.761	0.953
Product Technological uncertainty	0.861 – 0.931	0.864	0.923

Table 3 Multiple Regression Analysis

Independent Variables	*β*	*t*	Sig.	Tolerance	VIF
Asset Specificity	0.31	4.97	0.00	0.25	4.05
Product Technological Uncertainty	0.17	2.48	0.02	0.20	5.00
Transaction Frequency	0.24	4.62	0.00	0.38	2.64
Proportion of sales to e-supply chain integration promoter	0.13	2.42	0.02	0.36	2.81
Number of competitors	0.20	0.97	0.33	0.24	4.22
Number of customers	-0.40	-2.04	0.04	0.25	3.97

F-value = 150.60 ($p < 0.05$), $R^2 = 0.78$