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論文題目 ： 企業運用電子採購競標之研究

A Study of Enterprise Adaptation of E-Auction

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摘要

為了替企業減少採購支出，企業藉由 B2B 線上拍賣機制達到節省成本的效果，增加在市場上的競爭力，B2B 線上拍賣所帶來的減少成本效益已逐漸被企業所認同。本研究是以台灣北部及新竹地區的公司為研究對象，探討 B2B 線上拍賣的關鍵成功因素及點出目前使用 B2B 線上拍賣所面臨到的問題。針對本研究的需求，本研究流程包括歸納 B2B 線上拍賣之相關文獻、採訪相關專家及資料整合，運用決策試驗與實驗評估法，歸納出企業不願意使用 B2B 線上拍賣的考慮因素，並進而找出因素間的關連性及影響層面，之後再進一步運用因子分析法找出關鍵成功因素。藉由深入研究瞭解目前企業對於 B2B 線上拍賣之看法，透過實證分析整理出一個改進線上拍賣使用策略的參考，提高企業對 B2B 線上拍賣更有效的利用。

關鍵字: 線上拍賣、採購、電子化企業

A Study of Enterprises Adaptation of E-Auction

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Abstract

For companies to remain cost-competitive in the market, they must reduce the costs of their components and materials by sourcing from lowest-cost suppliers. One method to achieve this is through open bidding via the Internet by using a scheme called "e-auction." In this article, an in-depth literature review was carried out, followed by interviews with experts in procurement departments. The review and interviews have given us the tools to understand and evaluate the major concerns of companies that have already adopted an e-auction system. The Decision Making Trial and Evaluation Laboratory (DEMATEL) method is used to evaluate the dependent relations of evaluation criteria for opposed to use e-auction. Empirical experimental results show the "Internal force" as the most critical influencing factor in this study. This study also identified the nine key success factors through Factor Analysis method. The findings from our research may offer guidelines and more potential sources that can be utilized in strategic planning for buyers and suppliers. These findings may also help enhance companies' e-auction policies.

Keywords: E-auction, Procurement, E-business

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Chapter 1 Introduction

1.1 Research background

Facing the challenges of a fast growing and competitive market, enterprises are looking for ways to reduce costs. E-auction appears to deliver efficient results in reducing costs, increasing price competitiveness, and time saving. E-auction has created a tremendous change in its B2B procurement connection and the people behind e-auction are rewriting the way of doing business. B2B e-auction became a business essential and a popular method for the corporation to cut down on costs.

The primary reason companies seek e-auction is to increase savings from purchasing items. It gives those who seek more qualified buyers; increases the number of suppliers; compares prices from various suppliers around the world; and eliminates unnecessary cost in procurement that averages from 5 to 40%, savings from 10 to 50%, procurement transaction by 70%, and lowers cycle time by 50% (Kambil and van Heck, 2002)

In general, e-auction became a new trendy channel to conduct businesses for both buyers and sellers. Even though many have stated the benefits or advantages of using e-auction, some have studied the disadvantages of the tool.

Despite the benefits of e-auction, the literature suggests that e-auction faces a turbulent and uncertain future as companies strive to deploy Internet technology to improve current market processes. Concerns include stakeholder commitment, trust issues, ownership, one-sided value propositions, technology, user experience, and a critical mass of buyers/suppliers (Beldona and Raisinghani, 2004). Smart and Harrison (2003) pointed out that the main focus

on e-auction should not be to expect the bidding event to guarantee lower prices even though the price does drive companies that seek e-auction. Thus, the central purpose in this research is to analyze factors while using the e-auction tool. Smeltzer and Carr (2002) also stated the potential disadvantages such as distrust between buyer and seller and the possibilities of abusing and putting pressure on the price.

1.2 Research purpose and questions

E-Marketplaces can provide near perfect information across the supply chain and can radically change the nature of the buyer-seller relationship (Ash and Burn, 2006). Despite the benefits the study of economic focus states that it is uncertain whether e-auction will truly revolutionize the pricing mechanism.

The e-auction tool has started to gain greater usage in Taiwan only in the last few years. While it has become popular in Taiwan in recent years, many companies are using it to purchase products that are not mainly the key products to the company. Furthermore, very few companies have previously experienced using the key products within a large organization. E-auction has tended to be a much more difficult discipline in which to introduce the electronic aspects.

Therefore, in order to gain more understanding of the reasons that drive these successes and failures (Tully, 2000) of e-auction, we use results of various studies as the basis of this research. The main purpose of this study is to explore elements that affect the e-auction tool adoption in the companies and the current situation of B2B e-auction. We also need to understand why companies use e-auction and hence, develop a set of strategies on conditions for success while using the e-auction tool. We have divided these results into two focuses. Firstly

based on the finding of expert feedbacks, and literature reviews, the DEMATEL (decision making trial and evaluation laboratory) method is used to evaluate the factors to find out the relationships connected with defect factors. Secondly, we employed and gathered literature reviews, articles, and interviews with experts from the procurement department from companies in Science Park looking for the KSF (Key Success Factors) using Factor Analysis. Secondly, By using this method, people hope to find a way to prove the use of and to provide a more optimal use of e-auction. According to the literature review and the previously related research on e-auction, we have explored some directions in regards to the main theme for this study, which are:

1. Firstly, we want to find the drive and drawbacks of the influencing factors of the e-auction tool to get feedback from companies that have experienced and used the procurement tool.

2. Secondly, this research will conclude the issue in the use of the e-auction tool and hence propose the possible solution to the e-auction usage.

3. Finally, the research will deploy factor analysis and the dematel method to so that people can find the factors of e-auction and study what concerns the companies are currently facing.

1.3 Dissertation organization

The dissertation is organized as follows: Chapter One describes the research background and objectives. Chapter Two reviews the definition and the backgrounds and functionalities of the e-auction, which is followed by the current status review. Chapter Three discusses the research structure and

methodologies used. Chapter Four and Five discuss the findings to the study. Chapter Six is the conclusion, recommendation and research limitations to this research study.

Chapter 2 E-auction review and analysis

2.1 E-auction

E-auction is an important part of the B2B procurement tool. E-auction is a system that makes the business transaction online and purchase of goods directly with their suppliers so good. With almost immediate correspondence with crucial suppliers, people who control costs help open the door to potential suppliers in the business process. The e-auction system may make it possible to automate some buying and selling. The participating companies expect to be able to control parts of their inventories more effectively, reduce purchasing agent overhead, and improve manufacturing cycles. E-auction gives companies an opportunity to interact online with their business partners.

Aberdeen Group (2001) mentioned that e-auction is the creation of private, web-based procurement markets that automate communications, transactions, and collaboration between supply chain partners. It is about enhancing collaborations, streamlining processes, controlling costs, and enhancing information exchange within and across organization boundaries. Chaffey (2002) noted that e-auction should be directed at improving performance for each of the "five rights" of purchasing, which are sourcing items: at the right price, delivered at the right time, are of the right quality, are of the right quantity, and from the right source.

E-auction is as a supply aggregating event that lowers the price of goods for a buyer. Sellers have to go through a pre-qualification process before entering a bid on a price that both parties agree on. There are different researchers on

e-auction related topics. Bakos (1997) stated that the e-marketplace offers buyers and sellers a place to exchange their goods and creates economic value. E-auction web sites allow qualified and registered users to look for buyers or sellers of goods and services. Depending on the approach, buyers or sellers may specify prices or invite bids. Transactions can be initiated and completed. Ongoing purchases may qualify customers for volume discounts or special offers.

To understand what has been discussed or analyzed in the research, we have found several research studies related to the topic of e-auction. Table 2-1 gives a list of studies related to e-auction.

Table 2-1 Literature work and previous studies related to e-auction

Author	Contribution and finding
van Tulder and Mol (2002)	Conducted a case study on Philips Electronics to find how this company is applying reverse electronic auction in terms of trade-off choices, and in the context of tendering supply chain contracts.
Smart and Harrison (2003)	Studied the role of buyer-supplier relationship in reverse auctions.
Stein and Hawking (2002)	Studied suppliers view point on reverse auction.
Bartezzaghi and Ronchi (2003)	Conducted a case study to analyze the main factors driving the adoption of Internet-based tools in customer-supplier relationships.
Matthew and Fortin (2005)	Presented a conceptual model of the online auction consumer decision process and used and empirical study to test the relationship of the model using an experimental design.
Carter et al. (2003)	Discussed barriers to implementing e-auction, with its consequence s as cycle time and productivity.
Emiliani and Stec (2005)	Used quantitative methods to assess how wood pallet suppliers' reaction to online e-auctions and its impact on their business policies and practices.
Veeramani and Wang (1997)	Studied a queuing network model to evaluate the performance of auction-based distributed shop-floor control schemes.
Segev et al. (2001)	Modeled an online auction as a Markov Chain on a state space defined by the current price of the item and the number of buyers who were previously eliminated.
Agrali, et al. (2008)	Modeled and analyzed an auction-based logistics market where a short term contract is made between shippers and two types of carriers.
Chen et al. (2005)	Discussed using auctions for supply chain procurement.
Parente et al. (2004)	Analyzing online auctions in a B2B environment

Author	Contribution and finding
Teich, et al. (2005)	Described a multi-attribute e-auction mechanism, with a focus on the theoretical foundations to find the auction owner's preference across issues/attributes in an auction/negotiation setting.
Coltman et al. (2006)	Studied the drivers and impediments to successful e-business strategy and how to correctly use e-auction

2.2 Current experience

Since 1999, e-auction has been widely used between a supplier and buyers in business corporations. It enables clients to boost productivity, reduce costs, enhance performance, and increase its competitive advantages. Porter (2000) found that 25 % of the respondents expect to use reverse auction in 2000, and that number is expected to rise during the next several years. From Forrester's (2003) statistical research there were 25% of American firms (above US$100 million revenue) using e-auction with a 45% utility rate. The number of usage is increasing worldwide.

As Tan (2000) pointed out, online auction can be divided into four management models: C2C (E-Bay), B2C (Amazon), B2B (Freemarkets), and C2B (Priceline). In an English auction, the auctioneer begins the auction with the reserve price and then takes larger and larger bids from the customers until no one will increase the bid. The item is then sold to the highest bidder. An English auction has several advantages and disadvantages for both buyers and sellers. The advantage is that it is good for the seller in the way bidders can not know who else is bidding and inexperienced participants may get carried away in the heat of the moment. There are studies that mentioned the benefits of the e-auction tool (Blodget and McCabe, 2000; Mullane et al., 2001; Emiliani and Stec, 2002; Harrington, 2004; Puschmann and Alt, 2005; Fraser, 2005). In fact, more energy often needs to be focused on the change in management aspect of these engagements to make them successful.The disadvantage for both buyers and sellers with the English auction is that everyone must be in communication over the course of the auction, which can be expensive and difficult. Smeltzer

and Carr (2002) revised this process with a sealed first-price auction. In this type of auction all bidders simultaneously submit bids so that no bidder knows the bid of any other participant. The highest bidder pays the price he submitted. The drawbacks of this type of auction are that there is a lack of competition on prices. Sealed second-price auction is identical to the sealed first-price auction, except for the sealed second-price auction, the winning bidder pays the second highest bid. In silent auction, participants submit bids normally on paper, near the item. They may or may not know how many other people are bidding or what their bids are. The highest bidder pays the price he submitted.

By using the e-auction system, Lite-On Corporation has effectively reduced its average cost by 11% compared to the previous procurement. Companies such as Com2B (Taiwan) provides their professional services by encompassing system implementation, consulting service, outsourcing service, supplier's adoption, ASP hosting services, and support (Com2b, 2007). Ever since 2004, Uni-President Corp. has been using e-auction on integration orders and the total amount on e-auction has exceeded over 0.5 billion so far. By utilizing the e-auction system, it has given an efficient mechanism for Uni-President and suppliers to open up and find the competitive market price and shorten the e-auction administration processing and cycle. As result, it effectively reduced the running cost, increased overall efficiency, and reduced the cross-national currency limits.

There are some corporations that look positively into e-auction and analyze the possible pricing disadvantages in using e-auction. Beall et al. (2003) pointed out some reasons for using e-auction. He mentioned that the total procurement cost normally accounts for 60% of the total cost. E-commerce has

the greatest potential for growth and impact on company performance through the opportunities it's presented: faster entry into new market, expansion of global business models, lower transaction costs, and improved supply chain management (Kalakota and Robinson, 1999; Chopra and Van Mieghem, 2000; Jin and Wu, 2004). The benefits of using E-auction can create positive effects and cost minimization and it can also decrease the negotiation time and paper work. According to Barratt (2002), vendors report up to 30% savings in time and therefore the cost of process. With its accuracy, it can effectively save 30%~75% of total cost. E-auction represents a model for the way the Internet is changing the new economy. Carter et al. (2003) stated that e-auction has brought tremendous cost reductions of about 20%~30% for many commodities and found that the number of suppliers participating in an e-auction was positively related to auction savings.

Even though e-auction becomes a way to reduce cost and establish true market prices, it also gives immediate savings and substantial returns on investment. In addition, it increases the speed and efficiency of negotiations, consolidates a supply base or introduces new, high-quality global suppliers; leverages in-depth supply market information, etc. We still need to find the relationship among factors using Decision Making Trial and Evaluation Component Analysis (DEMATEL) method to make better sourcing decisions' and find out what the key success factors that drive the direction of e-auction use by using Factor Analysis method.

2.3 The drivers

An increasing number of companies are interested in using e-auction as one

of their purchasing tools. Consequently, we sought to identify the major drivers that influence buyers and/or the sellers in their decision to implement this e-auction tool. These drivers include:

2.3.1 Cost-cutting tool

Since e-auction can achieve gross savings of 5% to 40% with a typical average of 15% to 20% gross savings (Cohn, 2000), small firms gain a 15-25% reduction in prices in online marketplaces compared to those negotiated by the business itself (Ash and Burn, 2006; Lichtenthal and Eliaz, 2003). The e-auction tool is commonly used by senior managers to gauge the success of cost-cutting initiatives designed to maximize shareholder value (Child, 2002). Companies use the e-auction tool to reduce original procurement costs by approximately 5% to 10% through reverse auction and increased efficiency, which improves contract compliance, reduces cycle time, minimizes human errors, and results in better supply chain management. World Bank Prem notes state that the E-auction tool has generated numerous benefits, including enhanced transparency and public trust, and increased managerial efficiency (World Bank Prem Notes, 2004).

Some key factors for the successful adoption of e-auction are clear commodity specifications, large purchase lots sufficient to justify the involvement of a number of suppliers, appropriate supply market conditions, and an existing organizational infrastructure (Smeltzer and Carr, 2002; Subramaniam and Shaw, 2004). The e-auction opens doors to purchasing networks for suppliers and buyers, expands the selection of products, and makes information more easily obtainable. The e-auction tool, in general, links a vast network of connections and makes searching and contacting much more convenient.

2.3.2 Real-time bidding and response

To achieve a reduction in the cost of goods and services, e-auction is seen as both a price-cutting tool for purchasing, and a system that allows repetitive and real-time bidding by multiple suppliers, which ultimately reduces purchasing cycle time. Carter et al. (2003) described buyers who have used e-auction, and agrees that it increases levels of trust, provides greater access to supplier data, and decreases cycle times for suppliers. It strengthens connections in supply chain management; as everything is sorted out by computer, price benefits are efficiently decreased, and companies avoid unnecessary inventory (Smeltzer and Carr, 2002; Carter et al., 2003; Emiliani and Stec, 2005). It also helps negotiate better prices with suppliers, resulting in an average 5-12% price reduction and as much as a 20% reduction in costs (Smeltzer and Carr, 2002). Benefits are also realized by suppliers, including reductions in ordering and processing costs, reduced paperwork, improved cash flow, and reduced cost for credit control.

2.3.3 Transparent auction process

With dynamic pricing, sellers and buyers can immediately see competitors' prices (Smeltzer and Carr, 2003; Emiliani and Stec, 2005; Ginunipero and Sawchuk, 2000). A transparent transaction process is a key driver for e-auction. For example, companies that have private B2B supplier system, integrated with a supplier's order fulfillment system or linked to their product catalog on the website of the supplier's platform, will be able to reduce administrative tasks, accelerate processes, provide more paperwork accuracy, and improve transparency in the collaboration with its suppliers. A fair and transparent

auction process allows the buyer and seller to make their decisions effectively. The process and steps of every e-auction action is observed and recorded in the system.

2.3.4 Reduces cycle time

Process efficiencies play a major role in simplifying and automating procurement. Our survey results found that e-auction forces buyers to structure their bid before the bidding event, standardize the procurement process, and develop a strategy for purchasing; those factors have the effect of shortening cycle times (Carter et al., 2003). Companies also use electronic catalogs and search engines as part of their e-auction process, and these are helpful for providing a quick overview of the purchasing process and identifying the correct product in a shorter period (Subramaniam and Shaw, 2004; Eakin, 2003). The e-auction tool system automatically routes the product request and reduces cycle time to the responsible personnel faster and more effectively than traditional methods.

E-auction is not only a cost-cutting tool, but it also eliminates paperwork, improves data accuracy, and reduces inventory levels (Tully, 2000; Chan and Lee, 2003). The results of decision making can be implemented in a timelier manner, which in turn lowers costs and reduces approval time if done through a carefully calculated assessment (Schwartz, 2004; Sawhney, 2003; Shaw, 2004).

2.3.5 Increases geographical outreach

E-auction can affect the traditional markets as small manufacturers may be left out of channels that offer economies of scale advantages to larger manufacturers as well as exclusive distribution contracts (Rohm, 2004). We

observed that companies in Taiwan need to become more visible in foreign markets, and e-auction is one tool being used to accomplish this. We found that Taiwanese companies considerably increase their level of competition with foreign companies by using e-auction systems. E-auction should increase a company's efficiency and establish Internet distribution channels that will enhance the competitiveness of Taiwan's high-tech industry because of the existence of reduced barriers of entry.

2.4 The drawbacks

It is important to understand the barriers to e-auction system that make it difficult for certain companies to adopt and use the process. Even though the use of e-auction has grown rapidly in recent years, there are some challenges associated with it. Critics argue that the anticipated savings from e-auction systems are hard to measure. Some suppliers refuse to participate in bidding, believing it will result in less profit and more work. Since e-auction reverses the traditional way of doing business, some suppliers believe it might jeopardize their profit- making abilities.

2.4.1 Lack of system standards

Even though e-auction offers a way to cut costs and improve efficiency when procuring products, the lack of standards may be a problem, especially when the ordering system is integrated with other corporate programs, or for the accessibility of the electronic catalog. When implementing an e-auction, most companies are concerned with having a standardized system, accuracy of data transfer, data consistency, cost, Internet security, and certification. For example,

XML was used to obviate the need to reconfigure proprietary ordering systems when changing suppliers (Rohm, 2004). Product specification is another concern; when putting bids online, some suppliers complained about misleading product specifications and were concerned about their ability to realize a profit.

2.4.2 Negative impacts on trust, loyalty, and commitment

In many instances, e-auction alters the relationship between the buyer and seller. As the purchase decision is usually based on the lowest price, the buyer no longer feels loyal to the seller, and there may be a corresponding decrease in trust between the parties (Carter et al., 2003; Daly and Nath, 2005). Indeed, it is possible that buyers may destroy their sellers' trust (Jap, 2000; Reed, 2005). E-auction also has the potential to hurt a buyer's long-term performance by sowing distrust among suppliers (Beldona and Raisinghani, 2004; Gengatharen et al. 2005; Jap, 2003). Losing a buyer's commitment may result in a supplier's willingness to further invest on staff training and specialized tooling (Goldsby, 2003; Carter, 2003). At the same time, employees using this system may fear being replaced if they are perceived as unqualified and/or unreceptive to the e-auction tool. With the advent of e-auction, long-time partnerships may be damaged or destroyed.

2.4.3 Availability of resources

The availability of resources cannot be guaranteed until contracts are finalized, which makes it difficult for firms to coordinate negotiations between their various input resources and their production outputs. They mentioned that it could reduce their profit and might shorten the product life cycle. In terms of

risk, e-auction not only increases the competition in the market, but may also lose customers if they do not participate in the biddings. This also connects to the effects of long term planning by the corporations (Smeltzer and Carr, 2003). This may lead to uncertainties about the value of the object being auctioned (Laffont, 1997 and Nair, 2005).

2.4.4 Price pressures

Although pricing plays a major role in e-auction, quality, payment terms, and on-time delivery are other important factors to consider when choosing suppliers. Unforeseen costs involved in switching to a new partner should be included, as the new supplier may not be able to deliver the product efficiently or meet specific requirements. This reinforces the importance of prior consensus by both parties. Even though price may be the primary concern for the buyer, quality delivery, technical capability, and other factors may influence the buyer's willingness to use e-auction (Shaw, 2004). Suppliers may also face difficulties when, in an attempt to gain business, they may bid emotionally, which could produce an under-cost bid (Smeltzer and Carr, 2002; Tassabehji et al., 2006; van Tulder and Mol, 2002). When the purchase of goods is based on competitive prices, relationships with previous suppliers may be destroyed.

2.4.5 Ethical issues

In a study by Carter et al. (2003), phantom bidding (buyers place fake bids trying to reduce the bid price, or they use unqualified suppliers to stimulate competition) is one unethical issue facing users of an e-auction. This not only damages the firm's reputation but also lowers suppliers' incentive to further participate in another auction.

2.4.6 Unforeseen fees

Putting the business online in order to participate in e-auction is a high-tech innovation, but it often has negative results when price-only selection is involved. According to Emiliani and Stec (2005), administrative fees must be considered because either the vendor or the winning bidder must pay an administrative fee or a percentage of the contract value, which will have an impact on the final cost. For example, in a GE case study (Emililani, 2000), the company's cost-savings disappeared because of factors such as errors in supplier data, post-auction negotiations, and changes in specifications and quantities.

These results highlight the need for higher levels of human intervention in the form of supplier identification, product selection, approvals, and order generation. Although the use of an e-auction may increase the number of suppliers, the switching costs involved in adding new suppliers can be unpredictable, including transportation, qualifications, tooling, training, first-article inspection, alignment of information systems, and so forth. While e-auction may appear to be a high-tech innovation, it has the potential to propagate negative results with low-bid, price-only selections.

2.4.7 Barriers to system implementation

Some companies may not have sufficient facilities to embark on an e-auction or to use electronic tools. Commerce One noted there may also be resistance from purchasing personnel and a lack of trained employees. In one of our interviews, a manager from the procurement department noted that since some of the participating companies lacked knowledge about the e-auction,

training programs were formed prior to bidding so the companies could better understand the bidding system.

Chapter 3 Research process structure

In order to find the solution or the most optimal strategy of using the e-auction tool, we begin with literature reviews on the current status of e-auction or e-auction in the market. In-depth surveys on the literature review for the relevant information and interviews with experts from the related field focus on three main criteria that are cost management, internal force, and external force from e-auction. A list of directive questionnaires are designed and answered by procurement experts, and interviews are held for these experts to provide their own personal experience and concerns on e-auction. The questionnaires are divided into two sections, which are the drivers and drawbacks of the e-auction tool.

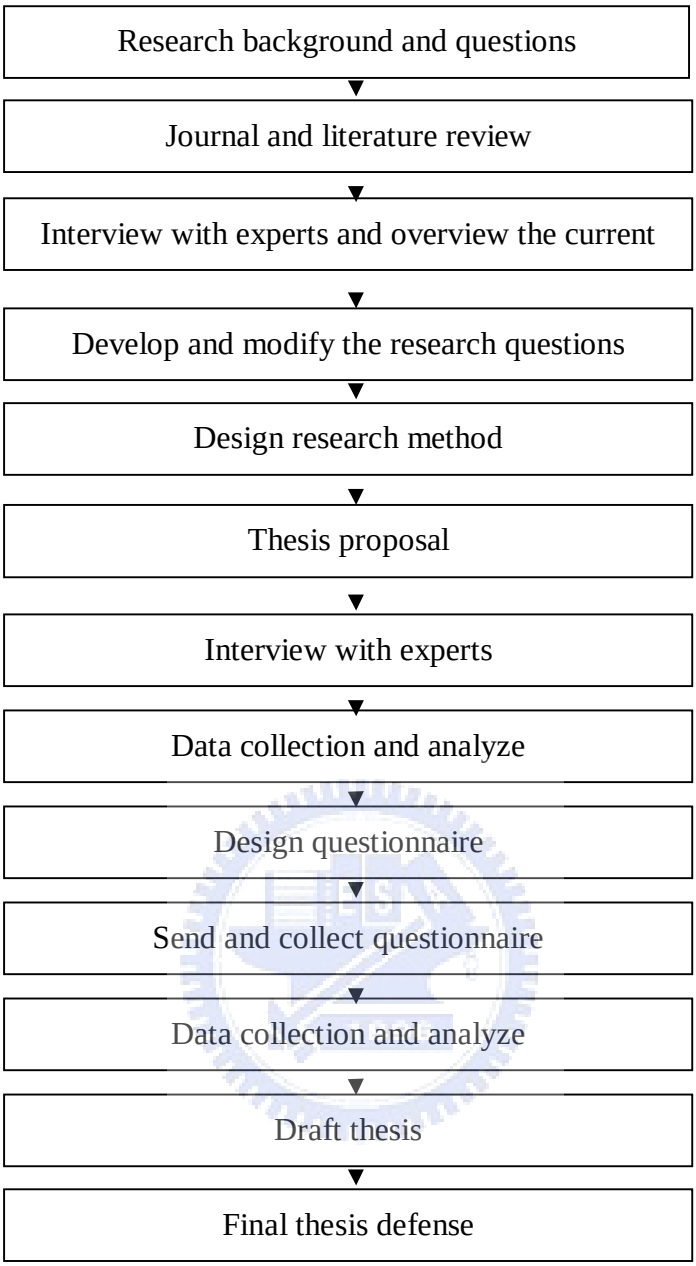

Figure 3-1 Research process flowchart

3.1 Sampling and data collection

Stage 1: Understand the core problem

The research problem is stated and to understand the problem, a detailed literature review is done to know what other researchers have solved in the past.

Stage 2: Factors survey

To know the current status, interviews had been set with professionals from the purchasing associations and procurement departments.

Stage 3: Questionnaire survey

Questionnaire questions are designed based on the interviews with the experts and literature reviews. Questionnaires are then sent out and answered by the experts from procurement departments.

Stage 4: Analysis stage

Data was collected and the DEMATEL & Factor Analysis method were used for evaluation.

Stage 5: Profiling stage

After the data collection and analysis of the result, interviews with the experts were performed once again to understand the data and hence make strategy and conclusions to the research problem.

3.2 Research method

To understand the drivers and drawbacks of the e-auction tool implementation, we set-up multiple interviews with procurement experts from high-tech companies in the Science Parks to gain a better understanding of the drivers and drawbacks of online reverse auction. In this research, drivers and drawbacks of the B2B e-auction implementation are defined in order to understand why companies would or would not use B2B e-auction as their purchasing tool. We began with an in-depth literature review on e-auction tool issues combined with interviews conducted with companies in the Science Parks in Taiwan. Our analysis is also based on research done by procurement experts in the Science Park. Multiple interviews were conducted to understand the steps for a more effective and feasible use of e-auction. This study seeks to recognize and

understand these drivers and drawbacks of e-auction tool, which is to enable a greater understanding of how e-auction can be effective in planning strategies to gain e-auction participation.

3.2.1 Literature review

We began with a literature review, followed by interviews with professionals in procurement departments. We set up multiple interviews with procurement experts from high-tech companies in the Science Parks. We sought a better understanding of the drivers and drawbacks of the online reverse auctions. In our research, the drivers and drawbacks of B2B e-auction implementation are defined in order to understand why companies would or would not use e-auction as their purchasing tool. Multiple interviews were conducted to understand the steps for a more effective and feasible use of e-auction. Our goal was to recognize and understand the drivers and drawbacks so as to gain a greater understanding of how e-auction can be effective in planning strategies for participation in e-auction programs.

3.2.2 DEMATEL method

The DEMATEL method can be used to construct interrelations between criteria and has been widely used to solve problems of interdependence among variables/criteria and restrict the relations that reflect characteristics within an essential systematic and developmental trend (Tzeng et al., 2007). For our background knowledge to utilize and understand how previous studies used the DEMATEL method, we found several studies that used the DEMATEL method to evaluate and solve problems (Tzeng et al., 2007; Chiu et al., 2004). According to Chiu et al. (2004), the DEMATEL method is used to build a relative relationship of decision factors. The relationships support a multi-level

viewpoint to plan a strategy which conforms to actual situations and a competitive environment. Therefore, we use the DEMATEL method to select the influences between the factors of e-auction.

3.2.3 Factor analysis

Factor analysis was developed by Spearman in 1904 (Tzeng, 1987). Factor analysis is used for more direct input response analysis of the data. Exploratory analysis is not always guided by a specific set of hypotheses, but can be guided by open questions about the number and kinds of factors which may be derived from a collection of variables. The number of factors retained for the analysis was determined by using the eigen-value criterion. Factor analysis is a statistical approach that can be used to analyze interrelationships among a large number of variables and to explain these variables in terms of their common underlying dimensions (factors). Many researchers have used this statistical approach to find a way of condensing the information contained in a number of original variables into a smaller set of dimensions (factors) with a minimum loss of information (Hair et al., 1992). The principal-factors method was used for the initial extraction process and only those factors explaining at least 10 % of the variance in the data and having properties of simple structure were retained for rotation (Hatcher, 1994). Procedures from the Statistics Package for the Social Sciences (SPSS) were used to conduct a factor analysis with principal component extraction and varimax rotation. Factors were considered significant and retained only if they had an eigen-value equal to or greater than 1, and variable with factor loading equals to or greater than 0.50. Thus, the factor analysis method is used to find the KSF from the e-auction usage factors.

Chapter 4 Building e-auction decision model based on DEMATEL method

4.1 Introduction

This study seeks to address the key influencing elements on e-auction use for high-tech firms in Taiwan. The DEMATEL method was used to find the connection and relationship between the key elements in e-auction use. The method helped to incorporate the effects of e-auction use and barriers. Thus, it is important for procurement personnel to foresee the barriers of e-auction prior to making the rightful decision on time. The main focus of this study is to find the barriers to buyers when using e-auction. The study employs interviews with procurement personnel to find the key variables that influence the decision-making on the usage. Hence, questionnaires (Appendix B) were sent to get more data for further evaluation. In this research study, we are using a decision-making trial and evaluation laboratory (DEMATEL) method to evaluate the relationships and relation structure among four main criteria with 16 sub-decision criteria. The findings are based on those sent questionnaires. Data were used in the evaluation of the elements. Each of the four main criteria represents the important areas of the influences.

This paper is organized as follows. Section 2 includes the background study related to the four main criteria. Section 3 includes the research method that we use in this paper. Section 4 is the discussion of the findings, and Section 5 presents the conclusion and recommendations to the research.

4.2 Literature study

E-auction is an effective solution to suppliers to place bids that are posted in real-time and get contracts offered by a customer (Smeltzer and Carr, 2002). Carter and Stevens (2007) suggest that the use of e-auction can create more opportunities on sourcing suppliers, whereas, from the buyer's perspective, e-auction can yield lower purchase prices. In this section, we review the past literature studies regarding to e-auction.

4.2.1 Operational cost

E-auction has been widely used in a variety of goods and services from suppliers and its potential has been researched and proved by various studies (Aberdeen, 2001). Challenges in e-auction must also be considered, whether these investments will bring the profits into the organization such as investments on hardware, software, staffing, and training required by e-auction. Supplier and buyer's telecommunication connection may also play a significant role in transforming data, as may government policy and regulations on e-commerce, or government control, etc. (Kheng and Al-Hawamdeh, 2002).

4.2.2 Internal force

One of the reasons that it is difficult for the purchasing department to approve or make decisions is because the negotiating power relies on the authorizer or the requester of the purchase (Puschmann and Alt, 2005; Kheng and Al-Hawamdeh, 2002). So the number of authorization or workflow stages must be reduced as authorization could significantly influence the usage of e-auction. Studies also indicate that negative adoption behavior can influence another when it comes to interaction network (Frambach and Schillewaert, 2002;

Reunis et al., 2004). Kheng and Al-Hawamdeh (2002) identified that training employees is a critical factor to the successful implementation of e-auction. The possible failure may be caused by insufficient or unskilled labor using the new system, which may end in unsatisfactory results.

4.2.3 External force

In many studies, price may not be the main reason or decision criteria to consider in the usage of e-auction. As the increasing numbers of e-auctions usage were carried out in the public sector, and savings achieved, concerns such as product quality, technical ability, cost, lead time, delivery managements, and payment terms, etc., may affect the decision-making factors (Puschmann and Alt, 2005). Porter (2000) mentioned if the degree of coordination effort with the supplier is too high and with very low order frequency, it is certainly not a candidate for e-auction.

4.2.4 System adaptability

According to Coltman et al. (2006) emphasize that the levels of IT infrastructure, skills, and online activity have highly influenced the e-business performance benefits. One needs to depend on the IT organizational capabilities, external environment, and managerial perceptions in order to find the right e-business strategy.

4.3 The DEMATEL method

In this research study, we have used the DEMATEL method as our analyzing method. We will start with a brief background study on how DEMATEL is used and studies that have used the DEMATEL method as their research tool, which is followed by how to implement the DEMATEL method.

The DEMATEL method can be used to construct interrelations among criteria and has been widely used to solve problems of interdependence among variables/criteria. The DEMATEL method has also restricted the relations that reflect characteristics within an essential systematic and developmental trend (Tzeng et al., 2007). For our background knowledge to utilize and understand how previous studies used the DEMATEL method, we found several studies that used the DEMATEL method to evaluate and solve the problem in their study (Tzeng et al., 2007; Chiu et al., 2004). According to Chiu et al. (2004), the DEMATEL method is used to build a relative relationship of decision factors. The relationship supports a multi-level viewpoint to plan a strategy which conforms to actual situations and a competitive environment. The method is shown as follows:

Definition 1 The pair-wise comparison scale may be designated by four levels, where the scores of 0, 1, 2, 3, and 4 represent "No influence", "Low influence", "Moderate influence", "High influence", and "Very high influence," respectively.

Definition 2 The initial direct-relation matrix Z is a $n \times n$ matrix obtained by pair-wise comparisons in terms of influences and directions between criteria, in which z_{ij} is denoted as the degree of which the criterion i affects the criterion j.

$$Z = \begin{bmatrix} z_{11} & z_{12} & \mathbf{L} & z_{1n} \\ z_{21} & z_{22} & \mathbf{L} & z_{2n} \\ \mathbf{M} & \mathbf{M} & \mathbf{M} & \mathbf{M} \\ z_{n1} & z_{n2} & \mathbf{L} & z_{nn} \end{bmatrix} \qquad (1)$$

Definition 3 The normalized direct-relation matrix X can be obtained through the equations (2) and (3), in which all principal diagonal elements are equal to

zero.

$$X = s \cdot Z \tag{2}$$

$$s = \frac{1}{\max\limits_{1 \le i \le n} \sum\limits_{j=1}^{n} z_{ij}} \qquad (i, j = 1, 2, \ldots, n) \tag{3}$$

where

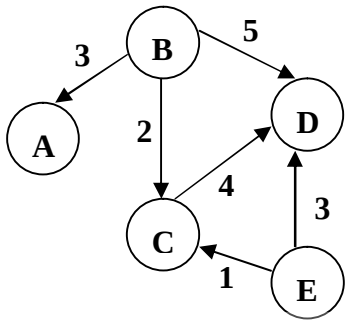

Figure 4-1 DEMATEL digraph

Definition 4 The total-relation matrix T can be acquired by using the equation (4), where the I is denoted as the identity matrix.

$$T = X + X^2 + \ldots = X(I - X)^{-1} \tag{4}$$

Definition 5 The sum of rows and the sum of columns are separately denoted as D and R within the total-relation matrix T through the equations (5), (6), and (7).

$$T = \left[t_{ij} \right] \qquad i, j = 1, 2, \ldots, n \tag{5}$$

$$D = (D_{i\cdot}) = \left(\sum_{j=1}^{n} t_{ij} \right) \tag{6}$$

$$R = (R_{\cdot j}) = \left(\sum_{i=1}^{n} t_{ij} \right) \tag{7}$$

where the D vector and R vector denote the sum of rows and columns, respectively.

Definition 6 Suppose D_i denotes the row sum of i-th row of matrix T. Then, D_i shows the sum of influence dispatching from factor i to the other factors both directly and indirectly. Suppose R_j denotes the column sum of j-th column of matrix T. Then, R_j shows the sum of influence that factor i is receiving from the other factors. Establish and analyze the structural model. On the base of the initial direct-relation matrix Z, the normalized direct-relation matrix X can be obtained through formula (2). Then, the total-relation matrix T can be acquired by using formula (4). According to Definition 5 and 6, a causal diagram can be acquired through formula (5)–(7). The causal diagram is constructed with the horizontal axis (D+R) named ‘‘Prominence’’ and the vertical axis (D-R) named ‘‘Relation’’. The horizontal axis ‘‘Prominence’’ shows how much importance the factor has, whereas the vertical axis ‘‘Relation’’ may divide factors into cause group and effect group. Furthermore, when I = j, i.e. the sum of row sum and column sum (D_i+R_j) shows the index of representing the strength of influence both dispatching and receiving, that is, (D_i+R_j) shows the degree of central role that the factor i plays in the problemtique. If (D_i–R_j) is positive, then the factor i is rather dispatching the influence to the other factors, and if (D_i-R_j) is negative, then the factor i is rather receiving the influence from the other factors (Tamura et al., 2002).

4.4 The Implementation process

The implementation process in this study is shown in Figure 4-1 DEMATEL digraph. It includes seven steps. That are interviewed from experts, draft the questionnaire, discuss the questionnaire content with experts, collect data, use the DEMETAL method, evaluate data, and produce the research result.

Step 1: Interview with experts

To understand the problem of this research, we have interviewed and discussed the issue with the experts.

Step 2: Draft questionnaire

After the discussion with experts, the basic understanding of the problem is achieved and the content of the questionnaire is drafted.

Step 3: Discuss questionnaire content with experts

To make sure that the questionnaire content is not misleading or misunderstood by the researcher, a second interview was set.

Step 4: Data collection

Questionnaires were sent out to the procurement personnel.

Step 5: DEMETAL method

The DEMETAL method is used to analyze the collected data.

Step 6: Data evaluation and research result

The DEMETAL method result is evaluated and analyzed to see the relationship between each factor; hence, the optimal solution can be selected according to the priorities on the factors.

4.5 E-auction influencing factors using DEMATEL method

The purpose of this study is to find and evaluate the key influence factors of e-auction usage. The Hsinchu Science Park is estimated to be the most important and most technologically based science park in Taiwan. The independent factors were found through interviews with the purchasing department personnel from the companies situated in Science Park. Hence, the impact relation for these

factors is further assessed using questionnaires constructed by the factors given from the experts in the purchasing sector.

4.5.1 Finding independent dimension

The purpose of this study is to find the related e-auction influence factors which were checked before and analyzed by a group of experts from the purchasing department. We used the DEMATEL analytical method to decode and identify the relationships among dimension and decision factors. Four dimension criteria resistance factors are: Operational cost, Internal force, External force, and System adaptability (See Table 4-2). See Table 4-3 for factor measurement explanation. The ranking on the scale from 0 to 4 is according to a number of linguistic terms. In Table 4-4, here we grouped factor F1, F2, F3, and F4 into Operational cost factor; F5, F6, F7, and F8 into Internal force factor; F9, F10, F11, F12, and F13 into External force factor F14, F15, and F16 into System adaptability factor.

Table 4-1 Dimension factors

Dimension factor	Factor explanation
Operational cost(I1)	Product stability, standards, and control
Internal force(I2)	Organization/department values, stuff beliefs, performance measures
External force(I3)	External supplier capabilities, cooperation ability and capabilities
System adaptability(I4)	System adaptability usability and system complexity/compatibility

Table 4-2 Criteria reference

Dimension	Criteria	Reference
Operational cost	Supplier verification	Beall et al. (2003), Carter and Stevens (2007)
	New supplier's quality and stability	Emiliani (2000), Sashi and O'Leary (2002)
	Price disclosure	Smart and Harrison (2003),

		Yu et al. (2007)
	New product maintenance	Sashi and O'Leary (2002)
Internal force	Authorization	Teich et al. (2005), Hur et al. (2006)
	Departmental verification	Emiliani (2000), Smart and Harrison (2003)
	Departmental collaboration	Emiliani and Stec (2005)
	Product-line collaboration	Expert Interview
	Purchasing personnel fluency	Hartley et al. (2004)
External force	Low participation motive	Harley et al.(2006), Carter & Stevens (2007)
	Privileged relation	Stein and Hawking (2002), Jap (2000)
	Limited suppliers	Yu et al.(2007), Emiliani and Stec (2001)
	Low profit motive	Jap (2000)
System adaptability	Low usability	Hur et al.(2006), Smart and Harrison (2003)
	System complexity	Yu et al. (2007), Harley et al. (2006)
	System compatibility	Harley et al. (2004)

4.5.2 Discussions

We understand that the reason why corporations employ e-auction systems is mainly to minimize the cost and work-flow of the overall procurement process. In order to realize what factors are influencing the usage on e-auction, we have listed the initial impact factors, which are assessed using questionnaires on the degree of influence to purchasing experts by discussion meetings. Factors are then divided into four first tiers (Table 4-3 Factor measurements), with a total of sixteen factors each representing its influences.

Table 4-3 Factors measurements

Dimension factors	Decision factors	Factor explanation
Operational cost(I1)	Supplier verification(F1)	Supplier's verification is uncertain or difficult.
	New Supplier's quality & stability (F2)	Risk on changing new supplier. Product quality stability is taking into concern.
	Price disclosure(F3)	Price disclosure creates more competition, less profit margin.
	New product maintenance(F4)	Maintenance cost on new supplier's product may be unpredictable.
Internal force(I2)	Authorization(F5)	Purchaser decides who wins the bid, authorization rights make it more difficult for the procurer to make decision.
	Departmental verification (F6)	New supplier's product quality is questioned, user refused to change.
	Departmental collaboration(F7)	Difficult to promote e-auction as departments refuse to use it.
	Product operation(F8)	User refuses to use new product for quality reasons.
	Purchasing personnel fluency(F9)	Procurement system tool fluency of purchasing personnel on new procurement system.

Dimension factors	Decision factors	Factor explanation
External force(I3)	Low participation motive(F10)	Suppliers refused to be part of e-auction as visible prices reduced their profit margin.
	Destruction on privileged relation(F11)	E-auction destroys the privileged relation.
	Limited supplier(F12)	Limited suppliers of product create less price difference.
	Supplier participation rate(F13)	Participating rate too low because of quantity or amount.
System adaptability(I4)	Low usability(F14)	Company refused to invest in the System adaptability, low usage frequency and low return.
	System complexity(F15)	Auction system complexity, decrease the usage.
	System compatibility(F16)	System use and compatibility on auction system platform

In order to find the influence factors of e-auction usage, seventy questionnaires were randomly sent out to the purchasing personnel, which includes senior managers, senior administrators, and assistants from various companies in Science Park and Taipei who are currently using or have never used e-auction for the assessment. Forty-five questionnaires were returned in the period of two months with thirty questionnaires as valid data (66 percent valid rate). Those independent factors were hence evaluated by the DEMATEL method. The DEMATEL method was chosen in the belief that it can solve problems and contribute to identify workable solutions by a hierarchical structure on the related factors. The results of the questionnaire are shown below.

We used Cronbach's alpha to check the reliability of the 16 sub-variables, according to the result, the "Importance level" from Cronbach's alpha is 0.801, (Note that a reliability coefficient of 0.70 or higher is considered "acceptable"), thus, the reliability is shown to be high using all 16 variables because alpha is 0.801. Where as the "Satisfaction level" from Cronbach's alpha is 0.785, this also exceeds reliability coefficient of 0.70, therefore, both importance and satisfaction has "high" reliability.

Table 4-4 Decision factors

	Operational cost	Internal force	External force	System adaptability
Operational cost(I1)	0.000	2.533	1.800	1.900
Internal force(I2)	2.533	0.000	2.200	1.867
External force(I3)	2.067	2.000	0.000	1.767
System adaptability (I4)	2.100	1.700	2.000	0.000

Table 4-5 The direct-relation matrix D

	Operational cost	Internal force	External force	System adaptability
Operational cost(I1)	0.000	0.378	0.269	0.284
Internal force(I2)	0.378	0.000	0.328	0.279
External force(I3)	0.308	0.299	0.000	0.264
System adaptability (I4)	0.313	0.254	0.299	0.000

Table 4-6 Direct influence on total matrix D

Total D	Row sum	Column sum	O+P	Ranking
Operational cost(I1)	0.930	1.000	1.930	1
Internal force(I2)	0.985	0.930	1.915	2
External force(I3)	0.871	0.896	1.766	3
System adaptability (I4)	0.866	0.826	1.692	4

Table 4-7 Total influence matrix T

	Operational cost	Internal force	External force	System adaptability
Operational cost(I1)	2.741	2.887	2.727	2.588
Internal force(I2)	3.126	2.719	2.862	2.681
External force(I3)	2.829	2.702	2.380	2.450
System adaptability (I4)	2.811	2.656	2.591	2.223

Table 4-8 Total effects and net effects

	D	R	D+R	D-R
Operational cost(I1)	10.943	11.508	22.451 (1)	-0.565(4)
Internal force(I2)	11.388	10.964	22.352 (2)	0.425 (1)
External force(I3)	10.361	10.560	20.921 (3)	-0.199(3)
System adaptability (I4)	10.282	9.942	20.224 (4)	0.340(2)

Generally, when the (D–R) (influence) value is plus, the factor belongs to the cause group. This indicates severity of influence for each alternative. This is assumed that the highest (D–R) has a higher influence to other factors with higher priority. Otherwise, the factor belongs to the effect group if the (D–R) value is minus.

However, the result has shown in Table 4-5, the Direct relation on matrix D of experts' scores on first-tier factors, followed by Table 4-6, the ranking of first-tier factors. It shows the normalized direct-relation matrix D by using equation (6). The total-influence matrix T is calculated by equation (5) and the matrix is showed on Table 4-7, Total influence matrix T. The relation clearly indicated on the Casual Diagram. The results identified the 'Internal Force' as the highest concern for decision-making. 'Operational cost' is the least influencing factor among the four main criteria (Table 4-8). Experts chose I1 (Internal force) as the most influencing factor rather than I2 (Operational cost) or I3 (External force) or I4 (System adaptability). This is because although the other three factors may also play vital influences to the e-auction involvement. The I1 (Internal force) still reigns as the main cause of the success of e-auction as shown in the result as F5 (Authorization) greatly influences the employment

and seems critical to all kinds of business processes.

In Table 4-9, total effects and net effects, Internal force (D–R) is positive (0.425), this show that the factor is dispatching the influence to the other factors and is prior to others and called master dispatcher. On the other hand, Operational cost (D–R) is negative. This is called the master receiver (a receiver without output), which means that the factor is receiving the influence from the other factors and is the least influenced factor among the four factors. System adaptability (D–R) (0.340) is closely related to other factors and should be considered as the second major 'connecting factor' with others for further improvement in the management priority list. Operational cost earns the lowest value among the four, which is considered as the master receiver. As the result has shown, the prioritization of alternatives of (D–R) is IF>IS>EF>OC.

When (D+R) (relation) receives the highest value, it indicates the value has a stronger relationship with another factor. Operational cost (D+R) (22.451) shows the highest degree of relation value that the factor plays a domineering relation between each alternative, where as System adaptability (D+R) (20.224) has the lowest relation with other factors. As the results have shown, the prioritization of alternatives of (D+R) is OC>IF>EF>IS.

Hence, with the help of a causal diagram, we may make proper decisions by recognizing the difference between cause and effect factors (Wu and Lee, 2007). Figure 4-2 Casual diagram of the dimension factor is drawn to visualize the complicated causal relationships of factors into a visible structural model, providing valuable insight for problem-solving.

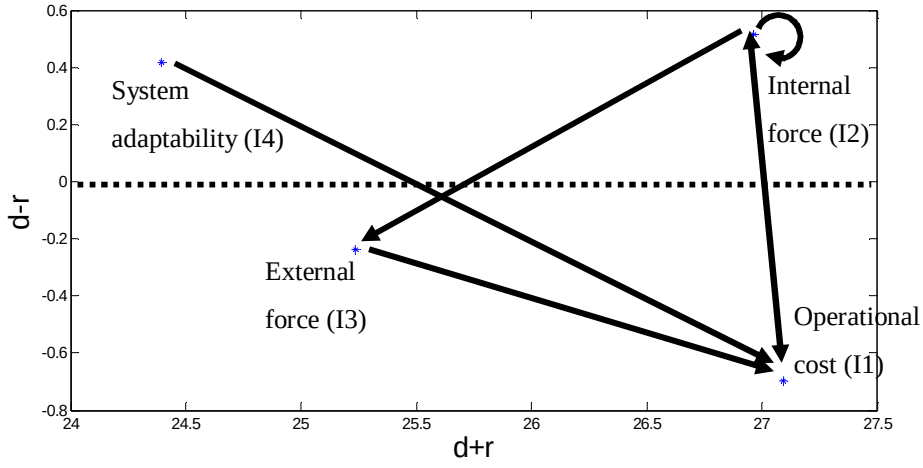

Figure 4-2 Casual diagram of the dimension factor

Table 4-9 Total effects and net effects decision factor

	Decision factor	d	r	d+r	d-r
Operational cost(I1)	Supplier verification (F1)	5.455	5.157	10.611	0.298
	New supplier's quality & stability (F2)	5.372	4.690	10.062	0.682
	Price disclosure (F3)	3.294	4.069	7.364	-0.775
	New product maintenance (F4)	4.505	4.710	9.215	-0.205
Internal force(I2)	Authorization (F5)	6.379	5.820	12.198	0.559
	Departmental verification (F6)	6.419	6.195	12.614	0.224
	Departmental collaboration (F7)	6.167	6.286	12.453	-0.119
	Product-line collaboration (F8)	5.804	6.870	12.674	-1.066
	Purchasing personnel fluency (F9)	5.143	4.741	9.883	0.402
External force(I3)	Low participation motive (F10)	17.985	19.117	37.102	-1.131
	Privileged relation (F11)	18.385	18.244	36.629	0.141
	Limited suppliers (F12)	18.107	18.762	36.868	-0.655

	Low profit motive (F13)	18.951	18.244	37.195	0.708
System adaptability (I4)	Low usability (F14)	6.231	7.103	13.334	-0.871
	System complexity (F15)	6.410	6.269	12.679	0.141
	System compatibility (F16)	6.662	5.932	12.594	0.731

The total effects and net effects of the decision factor are shown in Table 4-10. The number with the highest (D+R) means it is the most dominant factor in the dimension group. And the number with the lowest (D-R) means it is the lowest influence factor in the dimension group.

Table 4-10 Total effects and net effects of operational cost decision factor

Decision factors	D	R	D+R	D-R	Ranking
F1	5.455	5.157	10.611	0.298	2
F2	5.372	4.690	10.062	0.682	1
F3	3.294	4.069	7.364	-0.775	4
F4	4.505	4.710	9.215	-0.205	3

- Supplier verification (F1)
- New Supplier's quality & reliability (F2)
- Price disclosure (F3)
- New product maintenance (F4)

Results show that 'New supplier's quality & stability (F2)' (D-R) plays a stand-out role among the four decision factors. On the contrary, 'Price disclosure (F3)' (D-R) is the least significant factor and is strongly influenced by the other four factors Thus, we can say that if 'New supplier's quality & stability (F2)' is improved, the buyer or the purchaser will be less against the other three factors.

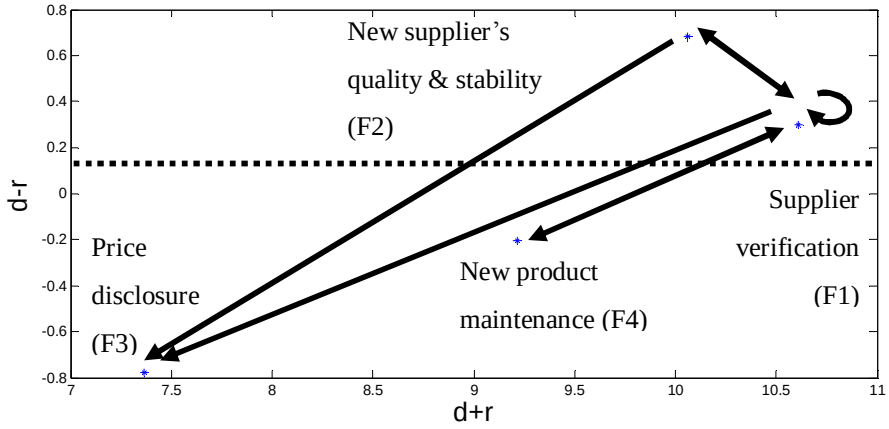

Figure 4-3 Casual diagram of operational cost

Table 4-11 Matrix T on operational cost

Threshold value=0.946	F1	F2	F3	F4
F1	1.304*	1.441*	1.247*	1.463*
F2	1.590*	1.172*	1.198*	1.411*
F3	0.946*	0.881	0.621	0.846
F4	1.316*	1.197*	1.002*	0.989*

Table 4-12 Cause and affect relationship derived by DEMATAL on operational cost

Cause	Affect	Cause and affect relationship
F1	F2, F3, F4	Supplier verification (F1) may affect the decision making on New supplier's quality & stability (F2), Price disclosure (F3) and New product maintenance (F4).
F2	F1, F3, F4	New supplier's quality & reliability (F2) may affect the decision making on Supplier verification (F1), Price disclosure (F3) and New product maintenance (F4).
F3	F3	Price disclosure (F3) may affect the decision making on Supplier verification (F1).
F4	F1, F2, F3	Product maintenance (F4) may affect the decision making on Supplier verification (F1), New supplier's quality & stability (F2), Price disclosure (F3).

Table 4-13 Total effects and net effects of internal force decision factor

Decision factors	D	R	D+R	D-R	Ranking
F5	6.3787	5.8196	12.198	0.559	1
F6	6.4189	6.1948	12.614	0.224	2
F7	6.1672	6.2859	12.453	-0.119	3
F8	5.8037	6.8699	12.674	-1.066	5
F9	5.1425	4.7408	9.883	0.402	4

- Authorization (F5)
- Departmental verification (F6)
- Departmental collaboration (F7)
- Product-line collaboration (F8)
- Purchasing personnel fluency (F9)

The value shows that Authorization (F5) heavily influences Departmental verification (F6), Departmental collaboration (F7), Product-line collaboration (F8), and Purchasing personnel fluency (F9) decisions (See Table 4-13). With higher degree of authorization, the procurement personnel has better control on the purchase and negotiation on the price. Purchasing personnel fluency (F9) is the second obstacle in the usage. This may be caused by procurement personnel that are not fluent in the e-auction process and as a result, it may slow down the whole purchase action.

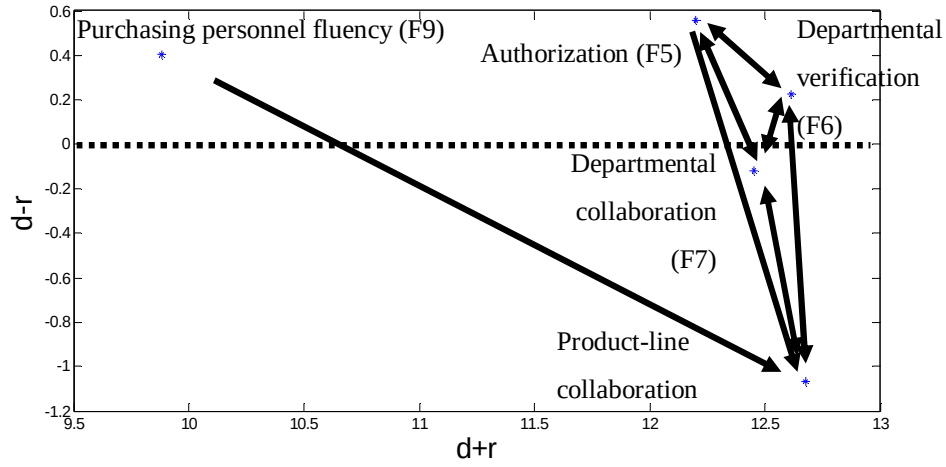

Figure 4-4 Casual diagram of internal force

Table 4-14 Matrix T on internal force

Threshold value =1.184	F5	F6	F7	F8	F9
F5	1.096	1.351*	1.382*	1.509*	1.040
F6	1.268*	1.174	1.393*	1.533*	1.050
F7	1.246*	1.317*	1.145	1.463*	0.996
F8	1.177	1.254*	1.258*	1.180	0.935
F9	1.032	1.099	1.108	1.184*	0.719

Table 4-15 Cause and affect relationship derived by DEMATAL on operational cost

Cause	Affect	Cause and affect relationship
F5	F6, F7, F8	Authorization (F5) may affect the decision making on Departmental verification (F6), Departmental collaboration (F7), and Product-line collaboration (F8).
F6	F5, F7, F8	Departmental verification (F6) may affect the decision making on authorization (F5), Departmental collaboration (F7), and Product-line collaboration (F8).
F7	F5, F6, F8	Departmental collaboration (F7) may affect the decision making on authorization (F5), Departmental verification (F6), and Product-line collaboration (F8).

Table 4-16 Total effects and net effects of external force decision factor

Decision factors	D	R	D+R	D-R	Ranking
F10	17.985	19.117	37.102	-1.131	4
F11	18.385	18.244	36.629	0.141	2
F12	18.107	18.762	36.868	-0.655	3
F13	18.951	18.244	37.195	0.708	1

- Low participation motive (F10)
- Privileged relation (F11)
- Limited suppliers (F12)
- Low profit motive (F13)

Based on Table 4-16, it is obvious that 'Low profit motive (F13),' total (37.195) and net (0.708) influence dominating the decision-making of External factor (I3) dimension. Because the purchase cannot meet the adequate profit to the seller, the seller is not willing to participate in the e-auction event. So it should be taken into concern as the primary obstacle in the usage of the e-auction tool.

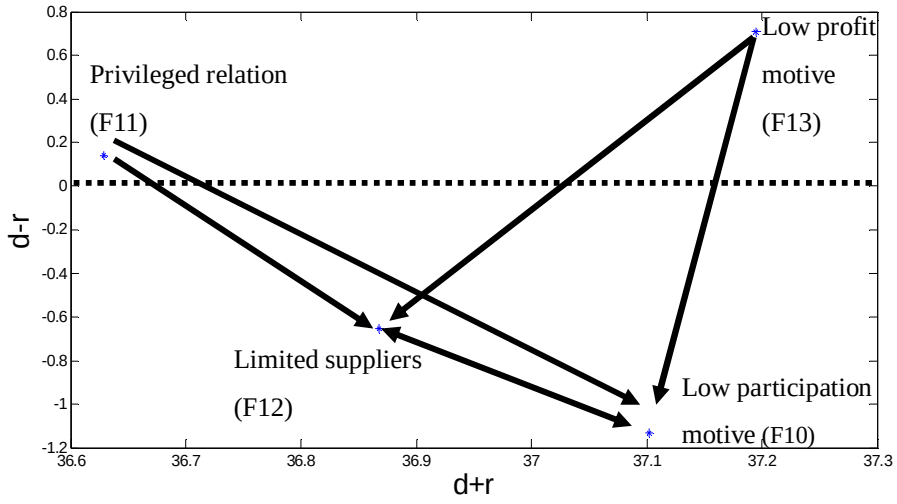

Figure 4-5 Casual diagram of external force

Table 4-17 Matrix T on external force

Threshold value =4.589	F10	F11	F12	F13
F10	4.499	4.279	4.667*	4.540
F11	4.838*	4.163	4.752*	4.632*
F12	4.795*	4.320	4.445	4.547
F13	4.985*	4.545	4.897*	4.524

Table 4-18 Cause and affect relationship derived by DEMATAL on operational cost

Cause	Affect	Cause and affect relationship
F10	F12	Low participation motive (F10) may affect the decision-making on Limited suppliers (F12)
F11	F10, F12, F13	Privileged relation (F11) may affect the decision-making on Low participation motive (F10), Limited suppliers (F12) and Low profit motive (F13).
F12	F10	Limited suppliers (F12) may affect the decision-making on Low participation motive (F10).
F13	F10, F12	Low profit motive (F13) may affect the decision-making on Low participation motive (F10) and Limited suppliers (F12).

Table 4-19 Total effects and net effects of System adaptability decision factor

Decision factors	D	R	D+R	D-R	Ranking
F14	6.231	7.103	13.334	-0.871	3
F15	6.410	6.269	12.679	0.141	2
F16	6.662	5.932	12.594	0.731	1

- Low usability (F14)
- System complexity (F15)
- System compatibility (F16)

According to Table 4-19 Total effects and net effects of System adaptability decision factor, decision-making is affected by low usability (F14), System complexity (F15), and System compatibility (F16). It clearly indicates that the most important key role that companies are concerned with is the usage of System compatibility (D-R) (0.731). System compatibility (F16) is a very important influence that also affecting other factors. With higher System compatibility of the System adaptability, the motivation to use e-auction to procure products is more applicable. Therefore, companies should stress the continuity of improving its System adaptability on System compatibility to meet the contemporary use and support the demand for e-auction process.

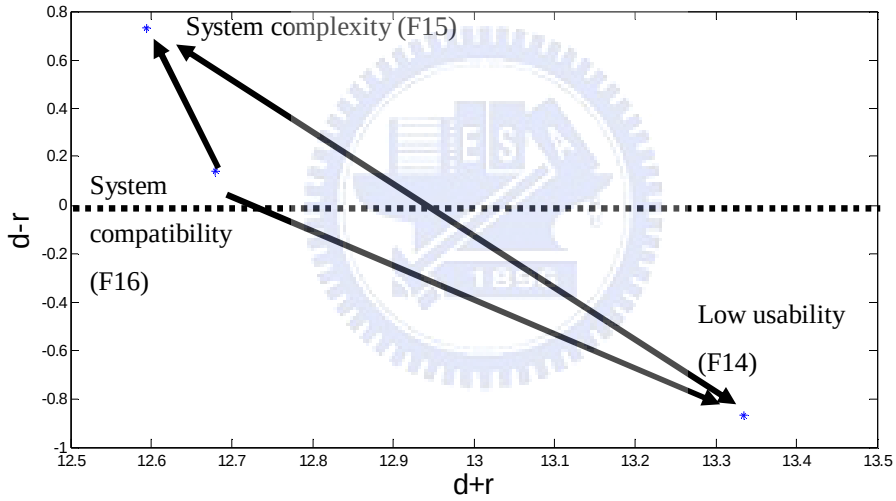

Figure 4-6 Casual diagram of System adaptability

Table 4-20 Matrix T on System adaptability

Threshold value =2.128	F14	F15	F16
F14	2.078	2.128*	2.026
F15	2.473*	1.886	2.050
F16	2.552*	2.255*	1.856

Table 4-21 Cause and affect relationship derived by DEMATAL on operational cost

Cause	Affect	Cause and affect relationship
F14	F15	Low usability (F14) may affect decision-making on System complexity (F15).
F15	F14	System complexity (F15) may affect decision-making on Low usability (F14)
F16	F14,F15	System compatibility (F16) may affect decision-making on Low usability (F14) and System complexity (F15).

4.6 Conclusion

An understanding of the key elements of process efficiency factors of e-auction is the first step in the move to reverse auction. Through the DEMATEL method we have found, in order to achieve operational efficiency, organization has to take achieving synergy into consideration firstly on the inner force factor. From the above findings, we found that companies entering e-auction primarily focus on cost saving, increase job efficiency, and avoid corruption. One of the main reasons for implementing e-auction amongst the companies is that they clearly shared similar objectives and motivations, which is to use e-auction to set the true price of goods and achieve in its best financial terms. But a major issue has been persuading the suppliers that e-auction may not be an appropriate means for stimulating product innovation given the continuous threat of exit by the buyer. Thus, in order to assess the strategic value of an auction, one needs to assess the fit with the firm's strategy. Key elements of firm strategy in this respect include price/trust, immediate/repeated, first/second mover, and buyer/supplier trade-offs.

Implementing a successful e-auction strategy involves careful analysis as to how it will affect a company and in which area and products it will obtain

financial and intangible benefits. Strong e-auction strategies enhance the use of e-auction when care is taken to adopt a low- error system and when companies clearly understand the purpose for launching such a system. In the end, e-auction is a process, not an easily learned, inconsequential tool to speed up online negotiation. Companies need to strategically utilize an e-auction system and assess the actual intrinsic and extrinsic benefits. With good planning, it can produce a win-win result in an e-auction for both buyer and seller. Companies should be convinced of the value of e-auction, know the exact needs of their clients, and be focused on the services they need.

The limitation of this research is it mainly focused on the procurement factors of high-tech companies, however, other traditional industries are not covered in this study. This research helps to deliver the primary element of e-auction use that is not found in other empirical study so far.

Chapter 5 B2B online reserve auction: Factors that affect the performance in Taiwan

5.1 Introduction

Taiwan's industries generate their profits based on OEM products. With international procurement and down steam suppliers, Taiwan's industries ought to find an effective way to optimize and reduce cost; therefore the e-auction tool seems to be one of the best alternative solutions for cost savings. For example, Hewlett-Packard Co. saved nearly $2 million in the first half of 2005 through a program that includes a new payment process, sourcing procedures, and online booking and attendee registration tools. HP utilizes the e-auction tool to procure products for its PCs, main mother boards, and PDAs. Companies that utilize this e-auction tool are TSMC, UMC, LiteOn Technology, and Formosa Group (Com2B, 2007; Liao, 2002).

For OEM companies or upper stream manufacturers who want to utilize reverse auction in their procurement, they will have to understand the function fully in e-auction tool to utilize it and avoid emotional bidding during the process. In the early years, companies sacrificed their profit in e-auction just to compete with their rival and this resulted in huge trade deficits. Problems occurred after switching to a new supplier. For example, the new supplier is not able to produce or meet the delivery date which results in huge switching cost.

With the increasing volume of vertical OEM business process, companies have the opportunity to refocus on their core business and outsourcing their tertiary businesses, but because the competition varies from supply chain to supply chain and procurement activities in the supply chain is based on the pricing; so instead of choosing long term businesses partners, pricing becomes destructive in procured products. This paper aims to find the success factors that will affect the outcome in procurement from literature review, expert interviews, and the use of factor analysis to further improve the findings. Special attention has been paid to support the key success factors for using online reverse auction. These results hope to bring a more in-depth perspective to companies who need to know more about the advantages of using online reverse auction for more effective procurement outcomes.

In this research, we want to understand the driving and drawback reasons of e-auction tool usage. This research began with and focused on the perspectives that influence the use of the tool. This research studied the e-auction tool and topics related to the research topic as the main background study.

5.2 Finding KSF using factor analysis method

Factor analysis examines the pattern of inter-correlations between the variables, and determines whether there are subsets of variables (or factors) that correlate highly with each other but that show low correlations with other subsets (or factors). This study employs literature review, information obtained from structured interview, and expert interviews. Obtained data were analyzed from factor analyses. Based on the information we got (Variables are shown in Appendix A), all questionnaires were set on a seven point scale (ranging from

1(least important) to 7(extremely important)). Questionnaires were sent to 250 procurement specialists from computer technology, semi-conductor, telecommunication, logistics, and textile manufacturers. 93 came out valid (Valid ratio of 37%). Samples are taken from companies that are using e-auction for procurement. Participants include computer and technology, semiconductor, telecommunication, logistic and service provider, and textile manufacturers in Taiwan. Factor analysis is a dimension reduction method. The main procedure of principal component analysis can be described in the following:

Step 1: Find the correlation matrix (*R*) or variance–covariance matrix for the objects to be assessed.

Step 2: Find the eigen-values $(l_k, k = 1,2,...,m)$ and eigenvectors $b_k = [b_{1k},...,b_{ik},...,b_{pk}])$ for assessing the factor loading $(a_{ik} = \sqrt{l_k} b_{ik})$ and the number of factors (*m*).

Step 3: Consider the eigen-value ordering $(l_1 > \mathbf{L} > l_k \mathbf{L} > l_m; l_m > 1)$ to decide the number of common factors, and pick the number of common factors to be extracted by a predetermined criterion.

Step 4: According to Kaiser (1958), use varimax criteria to find the rotated factor loading matrix, which provides additional insights for the rotation of factor-axis.

Step 5: Name the factor referring to the combination of manifest variables.

5.3 Results and discussions

The objective of this study is to investigate and analyze the key success factors of e-auction. Through the interview and structured questionnaires collected from experts interviewed, we hope to find valuable result for academic and practical use.

5.3.1 Measurements and selections

The data was collected from enterprises that use electronic procurement or electronic auction as their procurement tool. Data was compiled according to procurement type, total turnover in 2004, total amount in procurement, total procurement time spend, percentage in using electronic procurement, number of electronic procurement in 2004, cost saved from e-auction, the result after induct the tool, and the feed back from personal that used e-auction.

From the 93 valid questionnaires we collected, the information was collected from Taiwan's manufacturing sectors in computer and technology, semiconductor, opto-electronics and systems, communication and Internet service provider, and the textile industry. The highest data collected was from semiconductor manufacturers, totaling 56% and is presented in the following table:

Table 5-1 Industries and interviewees in procurement department

Types of industry	Employee	Percentage
Computer and technology	30	32%
Semi-conductor	52	56%
Communication and Internet service	5	5%
Textile	3	3%
Others	3	3%
Total	93	100%

From the above information, we found that 69% of the interviewees have 2 to 3 years of e-auction experiences, 59% of them have been participated in an e-auction 100 times or more in 2004, and 70% think that e-auction is a success.

When designing the factors, we referred to the past literature and research papers, and used previous interviews to format the initial questionnaire, which is summarized in appendix A. The result was extracted from the SPSS method. The number of factors retained for the analysis was determined using the Eigen-value (or Kaiser's rule) criterion. After the extraction, only components with Eigen-value $\geqq 1$ were kept for analysis. Nine key success factors came out $\geqq 1$ in the subsequent analysis. SAS User's Guide (1990) was applied to the retained components in order to obtain factor pattern coefficients. And these nine key success factors (KSF) (68%) were analyzed as the basics of the factors.

Table 5-2 Nine factors naming

Factors
Factor 1 E-auction system stability and reliability
Factor 2 Participation willingness
Factor 3 Choose the right procurement time
Factor 4 Procurement expert's price setting ability
Factor 5 Select the right supplier
Factor 6 Buyer's negotiation power
Factor 7 Standard setting and exploitation from new suppliers
Factor 8 Accommodation on product adjustment and adequate time measurement
Factor 9 Company support

Table 5-3 Eigen-value and proportion of the total variance

Variance						
Factors	Initial traits			Varimax rotation		
	Total	Variance%	Sum%	Total	Variance%	Sum%
1	5.778	21.402	21.402	3.032	11.229	11.229
2	2.629	9.735	31.137	2.677	9.915	21.144
3	2.024	7.496	38.633	2.113	7.825	28.969
4	1.686	6.244	44.877	1.980	7.333	36.302
5	1.615	5.983	50.861	1.827	6.767	43.069
6	1.317	4.878	55.739	1.806	6.687	49.757
7	1.225	4.536	60.275	1.778	6.586	56.343
8	1.097	4.062	64.338	1.605	5.946	62.289
9	1.009	3.736	68.073	1.562	5.785	68.073

5.3.2 Assessment on criterions

The factors were calculated using principal component analysis and varimax rotation to get factor loadings (Table 5-3 Eigen-value and proportion of the total variance). Each factor can be explained in factor naming (Table 5-2 Nine factors naming); structure of the factor matrix represents various variables to the factor contribution degree (under orthogonal revolution axis structured matrix, which also represents various variables and factor of correlation coefficient). Generally, an indicator is above 0.4, however, experts think that factor eight is the preparation time and also plays a major role in the bidding event. Thus, the measure of 0.394 would possibly contribute to the effect of bidding.

Table 5-4 Matrix of the variables on using e-auction tool

Factors		Eigen value	Total variance (%)
Factor 1 E-auction system stability and reliability			
V17	Stability	0.850	21.402
V18	Security	0.778	
V19	Reliability and fairness	0.740	
V16	Adaptability	0.615	
Factor 2 Participation willingness			
V6	Fair bidding	0.839	9.735
V5	Commitment from buyer	0.780	
V20	Participation rate	0.480	
Factor 3 Choose the right procurement time			
V23	Surplus supply from the supplier	0.729	7.496
V10	Right timing	0.719	
Factor 4 Procurement expert's price setting ability			
V14	Price listing ability	0.703	6.244
V13	Future demand estimation	0.586	
V4	Change on procurement procedure	0.548	
V15	Decrease in possible alliances from buyers or sellers	0.476	
V25	Best result achieved for buyer and seller	0.452	
Factor 5 Select the right supplier			
V22	Supplier's commitment after bidding	0.755	5.983
V26	Supplier measurement and assessment index	0.642	
V21	Supplier preparation before bidding start	0.394	
Factor 6 Buyer's negotiation power			
V1	The volume of sales	0.794	4.878
V2	The scale of buyer	0.786	
Factor 7 Standard setting and exploitation from new suppliers			
V12	Ability to attract new suppliers	0.820	4.536
V9	Product specification	0.764	

Factors		Eigen value	Total variance (%)
Factor 8 Accommodation on product adjustment and adequate time measurement			
V8	Adjustment on procurement type	0.723	4.062
V27	Rules and procedures informed before bidding began	0.501	
V11	Communication between parties before bidding began	-0.473	
V24	Services provide from system	-0.440	
Factor 9 Company support			
V3	Full support from manager	0.709	5.785
V7	Full support from participate department	0.632	

The first factor was named e-auction system. It has four variances such as system stability and system security. An e-auction bidding usually takes thirty minutes and bidders normally bid ten minutes before the section ends. Bidding may be extended when required. Therefore, the system's stability and security are vital in the bidding process. The system security also plays an important role in e-auction. Details such as bidding price or participants can be disclosed during the process with prior agreement. Other than the above, reliability on software system increases the number of participants due to fairness of a business transaction. Lastly, easy adaptability decreases transaction error.

The second factor, which depends on participation willingness, includes three variances. Rules and procedures must be clearly stated prior to each event. For example, quality standard, deadline, after service, etc. Next, each buyer commitment must be fully met. This will increase the trust and goodwill. Lastly, the goodwill of a company affects the participation rate.

Choosing the right procurement time is the third factor in this study. It concludes with two variances. Surplus supply gives advantages to the suppliers

that allow competing with prices. Right bidding time may result in a good purchasing bargain.

The fourth factor is the procurement bargain ability. There are five variances to be discussed. When considering price listing, the team should put a good assessment on price setting. This will affect the participation rate of the auction event. Having a good estimation on future demand allows more time on finding resources and negotiating prices. Thirdly, procurement procedure and process need to keep up and improve with time, which can be characterized in product specification and estimated in a possible procurement scenario. Thus, design of the best bidding plan avoids obscurity and misunderstanding. Fourthly, procurements need to effectively decrease the bidder alliance so that the monopoly or oligopoly bidding result. Thus, bidding must be terminated immediately when it happens. Lastly, sudden cuts on the price will increase the future purchase price. In order to prolong the business, the buyer and seller need to grow along the same line to achieve optimum demand and supply result. This called the win-win strategy.

Factor five is to select the right supplier. This has three variances. The first is the commitment of the supplier after the bidding ended; the buyer should carefully select the supplier according to the product manufacturer to avoid discrepancy. Deposits are made prior to when the e-auction begins. When bidding ends, second deposit on agreement will be made to ensure the bidder to fulfill and accomplish his task. The second variance states that assessment must be done to ensure quality and those standards meet expectations. This will avoid improper supplier selection that might affect product quality, service cost, and delivery date. Lastly, preparation time is crucial prior to the start time of bidding.

This will give time for the suppliers to work on the cost structure. Not only will this save time for both parties, but it will also help avoid emotional bidding to occur.

The sixth factor is the negotiation power from the buyer. According to the examples we used, most of the companies are well established firms. Therefore, negotiation power plays a major role in the procurement decision. For example, a volume driver or fame driver may attract more suppliers to participate in the event.

The seventh factor is the standard setting and exploitation on new suppliers. Competition in price and quality will determine who gets the deal if more suppliers participate at the event. Thus, the procurement team plays an important role in finding the right supplier. The second issue is standard setting; the more definite description of the product, the less confusion may occur.

The eighth factor is the accommodation on product adjustment and adequate time measurement. This means that each event should be tailor made to the specification of the products through characterized differences on every product and carefully analyzed to discover the possible supplier. The second variance is that participants know the rules and procedures and practiced with the system prior to the e-auction. Next, however, discrepancy between buyers and sellers must not occur in the assessment from the bidder, where the bidder can acknowledge further improvements about the e-auction with which they participated. Lastly, the system provider needs to educate the user on how to use the system and provide adequate information on system usage.

Factor nine is support from the company. The first variance is the support

from the managers. Full support from the top managers will accelerate optimum results. The next variance is to gain support from participating department. Good communication and interpretation give the advantage to relief from discrepancies between the procurement team and the participating department.

5.4 Conclusion

E-auction has been widely used by many corporations around the globe. In this study, we discussed the factors that led to the success of B2B e-auction. With the questionnaires we collected and the use of the factor analysis method to analyze, we concluded nine key success factors from the results we received. The results showed that e-auction brings effective procurement cost reduction, minimizes negotiation time, and creates transparent procurement processes. In addition to the above mentioned, it is not a tool to trap competitors. The study showed that the existence of a positive e-auction may replace a traditional procurement procedure to evolve into a more effective and transparent pricing negotiation.

Thus e-auction participants have to set their price limitation before entering an e-auction, calculate the cost to produce the goods before entering the reverse auction process, and plan for cost saving without sacrificing critical capabilities such as quality and standard. We found that not every supplier is capable or willing to participate in e-auction. The reason may be because they need extensive training and the other drawbacks are that the number of manufacturers participating also affects the final decision. To stay competitive, suppliers have to differentiate themselves from the product and provide on time

efficient services. When selecting the suppliers, the original supplier may face price changes or profit cuts from the competitors. E-auction should be used as a corporate strategy to stay competitive in the market. Thus, further research can focus on the e-auction pricing strategy and the changing nature of e-auction competition.

Chapter 6 Conclusions and suggestions

6.1 Conclusions and suggestions

The barrier of doing business has been vaporized by Internet connection. E-auction has increased a tremendous change and B2B is rewriting the way of doing business. One of the main reasons for implementing e-auction is that the companies clearly share similar objectives and motivations, which is to use e-auction to set the true price of goods and achieve its best financial terms. The fast growing e-auction has become essential for business and a popular method for corporations to cut down costs. The reasons for companies seeking e-auction are to reduce savings from purchasing items and operational efficiency (Puschmann and Alt, 2005). Thus, the value of e-auction cannot be ignored. The following is what our observations and managers have confirmed:

1. A clear categorization of products so that each purchase is defined in a specific group, which reduces problems in the purchasing process. Some managers mentioned that when implementing an e-auction, caution should be taken to base further progress on solid support from top-level managers, which is coupled with in-depth knowledge of the e-auction by all other applicable employees.

2. Assessment of competitors prior to bidding is another integral factor in pre-auction preparation. Knowing who the competitors are and what they are capable of (i.e., the technology they are using), as well as a careful assessment of suppliers and keeping the total number of suppliers manageable, are also key factors in the successful use of e-auction.

3. In order to assess the strategic value of an auction, one needs to assess the e-auction companies with the firm's strategy. Key elements of a firm's strategy in this respect include price/trust, immediate/repeated, first/second mover, and buyer/supplier trade-offs.

4. Collaboration from suppliers will also lead to increased supply process efficiency and effectiveness from both the buyer and the supplier. Thus, the use of strategies by buyers may influence the efficiency of the procurement process. For example, buyers may use adversarial tactics for formal cooperative agreements with suppliers, or alternatively, use a collaborative strategy to reduce costs.

5. In addition, the purchasing department must develop a policy that structures and guides all of the buying processes while leveraging the best expertise in the firm for each purchase category. When demand becomes stabilized, and product specifications no longer change with time, then organizations can reduce transaction costs by negotiating a long-term contract with suppliers and designing an automated procurement process for reordering the items.

6. It is strongly recommended that buyers conduct a follow-up discussion with the supplier after the event so they can provide and receive feedback, improve their online negotiation skills for future events, and learn differences in the acceptance of online negotiations among buyers and suppliers in the region. A key point is that price reduction should not be the primary concern or the only determining factor for supplier negotiations.

7. Easy adaptable System platform is preferred by the buyers and the suppliers. For example, Bayer established a standard directory for maintenance services. Xerox built its own catalog so the orders can be sent to Manpower electronically.

8. To increase a procurement process, however, is to reduce numbers of authorization stages. Personnel must effectively check the necessity level of authorization stages by means of decentralized procurement structures in order to have faster and better control over the procurement process.

9. Another concern is that the relationship between the buyer and seller may be ruined in the process of the competition. Thus, both buyer and seller need to consider carefully before entering the bidding process. E-auction should not be a burden to either the buyer or the supplier, and with a well-planned pricing strategy, positive results can be achieved for both parties. Security and mutual trust among businesses, customers, and other stakeholders are especially important to the development of an auction when it involves both buyers and suppliers. Trust plays a crucial role for a successful transaction.

10. Lastly, and most importantly, companies should realize that the primary role when adopting e-auction is to create value for the core business. When properly applied, e-auction can be a value-added strategic tool, but when it is inappropriately used, it can cause major damage to a company.

6.2 Research scope and limitations

The e-auction system has been widely used within high-tech companies to search for lower costs and to reduce administration costs. Literature reviews, interviews with procurement experts, and questionnaires are used to find the most optimal strategy. As the research is mainly looking for the driver and potential shortcomings of e-auction for companies- the research scope is limited to the region within companies situated in the Science Park.

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Appendix-A

List of 27 Criteria

Criteria	Criteria description
V1	The scale of procurement
V2	The scale of buyer
V3	Full support from manager
V4	Change on procurement procedure
V5	Commitment from buyer
V6	Fair bidding
V7	Full support from participate department
V8	Adjustment on procurement type
V9	Product specification
V10	Right timing
V11	Communication between parties before bidding begin
V12	Ability to attract new suppliers
V13	Future demand estimation
V14	Price listing ability
V15	Decrease possible alliances from buyers or sellers
V16	Adaptability
V17	Stability
V18	Security
V19	Reliability and fairness
V20	Participation rate
V21	Supplier preparation before bidding start
V22	Supplier's commitment after bidding
V23	Surplus supply from the supplier
V24	Services provide from system
V25	Best result achieved for buyer and seller
V26	Measurement index
V27	Rules and procedures informed before bidding begin

Appendix-B

網路競標因素之評估準則及評量權重調查問卷

親愛的專家、先進您好：

本問卷目的在瞭解採購單位不願意使用網路競標因素之評估準則及評量權重調查。懇請 鈞座撥出五分鐘，比較各項考量項目的相對重要性。您的保貴意見將有助於目前已使用或尚未使用網路採購挑選出較佳之使用模式。

壹、 基本資料調查

A.產業背景

背景屬性: □ 半導體產業 □ 光罩產業 □ TFT-LCD 產業 □ 生物技術產業 □電腦及週邊 □通訊 □光電 □精密機械 □IC 設計 □其他

B.專家背景

相關資歷: □高階主管 □部門主管 □基層主管 □工程師/管理師 □其它

一、公司基本資料：

1.貴公司每年營業額(新台幣)約多少?

□ (1) 1 億元以下 □(2) 1 億元~10 億元 □(3)11 億元~100 億元

□ (4)101 億元~500 億元 □(5)501 億元~1000 億元 □(6)1000 億元以上

2.貴公司每年總採購金額(新台幣)約多少?

□ (1) 5 仟萬以下 □ (2) 5 仟萬~1 億元 □ (3)1 億~10 億元

□ (4)11 億元~50 億元 □(5)51 億元~100 億元 □(6) 100 億元~500 億元

□ (7)500 億元以上

不/未使用網路競標填基本資料調查第二部份，已使用網路競標填基本資料調查第三部份。謝謝！

二、不/未 使用網路競標答卷者看法：

1.已參與傳統採購年數? □(1) 1~2 年 □(2) 2~3 年 □(3)3~4 年□(4)5

年以上

2.請問您對於使用網路競標的成效定義為何? (可複選)

□(1).大幅降低採購成本　□ (2)大幅增加採購作業效率　□ (3)採購作業透明化　□(4)其它 (請說明) _____

3.您認為下列哪一個選項阻礙網路競標之使用?(可複選)

□(1)供應商驗證成本高□(2)新供應商不確定性高□(3)利益結構減少□(4)維修成本增加□(5)決策權力受限□(6)產品驗證困難□(7)內部合作關係變差□(8) 製程配合因素□ (9)系統使用者經驗不足□ (10)供應商意願低□(11)破壞採購合作關係□(12)採購產品特殊□(13)採購金額太小□(14)採購系統使用率低□(15)採購系統軟體操作不易□(16)系統安全或相容度

4.如已使用過網路競標，建議網路競標可以改進的方向?

三、已使用網路競標答卷者(公司)看法：

1.請問貴公司開始採用網路競標的時間？

□(1) 1 年以下 □(2) 1~2 年 □(3) 2~3 年 □(4) 3 年以上

2.貴公司透過網路競標的採購金額約佔總採購金額的百分比？

□(1)1%以下 □(2)2%-5% □(3)6%-10% □(4)11%-15% □(5)16%-20% □(6)20%以上

3.貴公司透過網路競標平均成本節省比例？

□(1)5%以下 □ (2)5%-10% □ (3)11%-20% □(4)20%以上

4.貴公司透過網路競標節省採購議價作業時間比例？

□(1)5%以下 □ (2)5%-10% □ (3)11%-20% □(4)20%以上

5.請問貴公司 2005 舉辦網路競標總次數?

□ (1)10 次以下 □(2)10 次-50 次 □(3)50 次-100 次 □(4)100 次-300 次 □(5)300 次-500 次 □(6)500 次以上

6.請問貴公司 2006 舉辦網路競標總次數?

□(1)10 次以下 □(2)10 次-50 次 □(3)50 次-100 次 □(4)100 次-300 次 □(5)300 次-500 次□(6)500 次以上

7.請問貴公司 2007 Q1&Q2 舉辦網路競標總次數?

□(1)10 次以下 □(2)10 次-50 次 □(3)50 次-100 次 □(4)100 次-300 次 □(5)300 次-500 次□(6)500 次以上

8.請問您對於使用網路競標的成效定義為何? (可複選)

□(1).大幅降低採購成本 □ (2)大幅增加採購作業效率 □ (3)採購作業透明化□(4)其它 (請說明) _____

9.貴公司之網路競標作業系統為自行開發設計，或使用軟體公司（例如 Com2b）？

□自行開發設計，已使用幾年_____年

□使用軟體公司，委託之資訊公司為何？_____

貳、DEMATEL 問卷調查(以下全部，未使用網路競標和已使用網路競標皆需要答)

準則重要度及滿意度評估

重要度: 對使用網路競標該項之重要程度；**滿意度:** 對使用網路競標該項之滿意程度。

表一、採購單位不願意使用網路競標影響準則說明表

	影響準則說明	準則重要程度 1~10 準則最重要:10 準則最不重要:1	準則滿意度 1~10 準則最滿意:10 準則最不滿意:1
一. 成本效益阻力			
1. 供應商驗證成本高	供應商更換之供應商驗證成本高。		
2. 新供應商不確定性高	廠商合作穩定度低影響產品品質，導致更換風險高。		
3. 利益結構減少	價格外洩導致競爭對手破壞利益結構。		
4. 維修成本增加	新供應產品維修體系建立成本變高。		
二. 公司內部因素阻力			
1.決策權力受限	採購人員受限於授權者，由授權者決定最終得標廠商。		
2.產品驗證困難	供應商產品素質不一，使用單位不同意更換。		
3.內部合作關係變差	新制採購不被認可，導致實施困難。		
4.製程配合因素	使用單位不願使用新原料，品質良率不確定。		
5.系統使用者經驗不足	採購人員新制採購系統使用能力程度不足。		
三. 外在環境影響因素			
1.供應商意願低	價格透明導致利潤被擠壓，供應商配合意願低。		
2.破壞採購合作關係	怕破壞優先供貨的良好合作關係。		
3.採購產品特殊	供應商產品特殊或各有特色或更新過快，且供應商少。		
4.採購金額太小	金額過小或願意參加招標的供應商或廠商少。		
四.資訊系統因素			
1.採購系統使用率低	公司不願意投資網路採購電腦系統。		
2.採購系統軟體操作不易	拍賣系統複雜或繁瑣，增加採購流程及使用困難。		
3.系統安全或相容度	招標資訊系統交易平台安全信賴度低。		

表二、構面準則關聯性調查表

填寫方式例如:

成本效益阻力	①供應商驗證成本高	②新供應商不確定性高	③利益結構減少	…
①供應商驗證成本高	0	1	4	…
②新供應商不確定性高	2	0	3	…
③利益結構減少	3	1	0	…

(0:無影響；1:非常低度影響; 2:中度影響；3:高度影響；4:極高度影響)

1. 假如「產品穩定度低」功能，對「廠商供應商驗證成本高」的決策沒什麼關係，您判定僅有 0 的影響程度；
2. 但對於「產品穩定度低」對「廠商供應商驗證成本高」的決策決定非常有影響，您判定有 4 的影響程度。

表三、成本效益阻力構面準則關聯性調查表

成本效益阻力	1. 供應商驗證成本高	2.新供應商不確定性高	3. 利益結構減少	4. 維修成本增加
1. 供應商驗證成本高	**0**			
2. 新供應商不確定性高		**0**		
3. 利益結構減少			**0**	
4. 維修成本增加				**0**

(0:無影響；1:非常低度影響; 2:中度影響；3:高度影響；4:極高度影響)

表四、公司內部阻力構面準則關聯性調查表

公司內部阻力	1.授權採購決策權力	2. 規格驗證困難	3.內部合作關係	3. 製程配合因素	4.新採購系統使用者經驗不足
1.決策權力受限	**0**				
2.產品驗證困難		**0**			
3.內部合作關係			**0**		
4.製程配合因素				**0**	
5.採購系統使用者經驗不足					**0**

(0:無影響；1:非常低度影響; 2:中度影響；3:高度影響；4:極高度影響)

表五、外在環境阻力構面準則關聯性調查表

外在環境影響因素	1.供應商意願低	2.採購合作關係	3. 採購產品特殊	4.採購金額太小
1.供應商意願低	**0**			
2.採購合作關係		**0**		
3.採購產品特殊			**0**	
4.採購金額太小				**0**

(0:無影響；1:非常低度影響; 2:中度影響；3:高度影響；4:極高度影響)

表六、資訊系統影響準則關聯性調查表

資訊系統影響	1.採購系統使用率低	2.採購系統軟體操作不易	3.系統安全或相容度
1.採購系統使用率低	**0**		
2.採購系統軟體操作不易		**0**	
3.系統安全或相容度			**0**

(0:無影響；1:非常低度影響; 2:中度影響；3:高度影響；4:極高度影響)

表七、採購單位不願意使用網路競標影響準則調查表

	1. 成本效益阻力	2. 公司內部因素阻力	3. 外在環境影響因素	4. 資訊系統因素
1. 成本效益阻力	**0**			
2. 公司內部阻力		**0**		
3. 外在環境影響			**0**	
4. 資訊系統因素				**0**

(0:無影響；1:非常低度影響; 2:中度影響；3:高度影響；4:極高度影響)

問卷到此結束，麻煩您再檢查一次是否全部作答，感謝您的大力支持，謝謝！