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SETTING UP AN E-MARKETPLACE

- THE CASE OF TAIWAN REFRIGERATION & AIR-CONDITIONING PRODUCTS/SERVICES

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ABSTRACT

For many years the Energy Research Laboratory of the Institute of Industrial Technology Research (ITRI) in Taiwan has provided R&D and technical support to the refrigeration/air-conditioning industry. Although the majority of vendors in this industry are small companies with limited activities on the Internet, they have annual revenue of \$3 billion US dollars. This paper studies the competitiveness and market positioning of an ITRI operated e-marketplace specializing in refrigeration/air-conditioning products and services. The authors propose a business strategy to evolve this e-marketplace in three stages with each stage offering more advanced services.

Keyword: Refrigeration, E-Marketplace, Air-Conditioning

1. INTRODUCTION

Refrigeration and air-conditioning products in the consumer market include air-conditioners, de-humidifiers, air purifiers, and refrigerators etc. In the industrial market there are large freezers for food industry; large coolers used in the chemical processes by textile and petro-chemical industries; de-humidifiers used in lithium battery plant; and clean-room air-conditioning systems used in semi-conductor, pharmaceutical, bio-tech industries as well as in operation rooms of hospitals.

The equipment and processes used in high-tech industries always require stringent environmental conditions with precise control over temperature, humidity, and air purity. As the traditional industries in Taiwan are gradually changing over to high-tech industries, demand for high quality refrigeration and air-conditioning will increase. Once Taiwan joins the WTO, fierce foreign competition in the refrigeration/air-conditioning sector is inevitable, hence increasing efficiency and establishing distribution channels via the Internet to enhance the competitiveness of Taiwan's refrigeration and air-conditioning industry is suggested.

Although Internet commerce has experienced some setbacks this past year, its potential should not be underestimated. Possibly, there were too many B2C web sites competing to give consumers free services in order to increase the customer base or market share. Notwithstanding, this business model failed to produce profits. The B2B model, on the other hand, can bring efficiency and cost down for both suppliers and clients. An e-marketplace can be defined as an electronic or on-line platform that provides, between buyers and sellers, support for all steps of the entire order fulfillment process. Strader (1997)[6] demonstrated that e-markets enjoy

transaction cost advantages over traditional markets from both the buyers' and sellers' perspectives.

The purpose of this study is to explore the feasibility of setting up an e-marketplace specializing in refrigeration and air-conditioning products and services. Vendors from each sector of Taiwan's refrigeration and air-conditioning industry have been interviewed to learn of their concerns and interests in participating in such an e-marketplace.

This paper is organized in five sections: Section II reviews the literature on the operation of e-marketplaces. Section III describes the competitiveness of e-marketplaces operated by different enterprises with different market positions. Section IV describes the current status of the Taiwan refrigeration/air-conditioning industry and the market positioning of an e-marketplace operated by ITRI. Section V proposes the service offerings in three developmental stages for the refrigeration/air-conditioning e-marketplace of Taiwan. Section VI discusses our conclusions and recommendations.

2. LITERATURE REVIEW

To understand the characteristics or to master the success factors of an e-marketplace, one has to categorize the different types of e-marketplace which are differentiated by their operators. Bakos (1991)[2] refers to the firm operating the e-marketplace as the intermediary. The intermediary may be a market participant (a buyer or seller), an independent third-party, or a multi-firm consortium. This study further differentiates the market participant into a friendly (complementary to other participants) participant; a hostile (competing against other participants) participant; and a single-buyer participant (buy from multi-sellers) or a single-seller participant (sell to multi-buyers). Detailed descriptions of these participants are explained in Section III.

Jutla (1999)[5] classified e-marketplaces into three categories: the e-broker (cybermediary) model (e.g. amazon.com), the manufacturer model (e.g. Dell), and the auction model (e.g. priceline.com). The e-broker is equivalent to the independent third-party in our study, the auction model refers to the transaction method rather than differentiating the operator, and the category of manufacturer really did not distinguish the different market position and market strengths as we have distinguished them in Section III.

Jutla (1999)[5] also looked into the success factors of an e-marketplace: strategic factors, technical factors, and functional factors. Strategies include first-to-market, brand establishment, customer focus, targeted marketing,

outsourcing, and development of a customer or user community, etc. Technical issues encompass quality of service items such as response time, throughput, reliability, etc. Functional aspects include facilitation of product customization, support for negotiation, and access to a similar-interest user community, etc. In this paper, we describe the planning of an e-marketplace for a specific industry. We suggest different service offerings for three developmental stages which are to meet some of the strategies as well as possess some of the functionalities described above. The technical performance objectives for our e-marketplace are assumed to satisfy all participants' needs and, therefore, are not within the scope of this study.

3. THE COMPETITIVENESS OF E-MARKETPLACE OPERATORS

B2B e-commerce can be interpreted as an enterprise conducting business with another enterprise over the Internet. If this is done on an individual basis, there is no marketplace involved. However, if many enterprises go to one website to do business with one another, then this website acts just like a marketplace. E-marketplaces may be classified into the following categories by the different kinds of websites owners:

3.1. E-marketplace of a Single Enterprise

A very large enterprise that buys from a large number of suppliers is in a good position to operate an e-marketplace on its own website. For example, General Motor buys a large variety of products and components for a large amount of money from a large number of potential suppliers. GM announces the products that it wants to buy, the volume, the specifications, and the delivery requirements on its website, and vendors throughout the world respond to the request for proposals by sending their responses to GM's website before the due date. GM can efficiently pick the most appropriate vendors through this on-line vendor selection mechanism.

GM and the vendors benefit from this Internet e-marketplace because no paperwork needs to be prepared, no express mail is required, no manpower is needed to compare the bids, as well as numerous other advantages. Decisions can be made in relatively short time, and the GM purchasing department saves millions of dollars.

A very large enterprise that sells to a large number of customers is also in a good position to operate an e-marketplace on its own website. For example, China Steel is at the top of the supply chain of various steel products in Taiwan. China Steel can list all of its products on its website and ask buyers to e-mail their purchase orders. China Steel can vary its prices instantaneously reflecting the latest supply and demand situations. China Steel can even ask the buyers to bid for its products at times when demand exceeds supply. China Steel can also base the knowledge of the latest demand for its products and adjust its production schedules accordingly. Since China Steel is the largest supplier of such steel products in Taiwan, all of the downstream vendors will have no choice but to cooperate with China Steel's e-marketplace selling mechanism.

3.2 E-marketplace Operated by a Third Party Not in the Same Industry

Section 3.1 describes the e-marketplace of a large seller or a large buyer doing business with a large group of its business partners. This section describes the situation of a large group of vendors that need to do business with one another. In such a situation an opportunity exists for a third party to operate a website as the e-marketplace which will allow vendors to conduct business among themselves as well as for their customers to do business with them.

The incentives for vendors to join such an e-marketplace 1.)includes: Most vendors do not have the technical expertise or capital to set up an e-commerce transaction system, nor does there exist enough business to justify their individual investment or to cover recursive maintenance 2.)expenses. An e-marketplace can generate a clustering effect by attracting more vendors and clients, which will translate into higher visibility and more businesses for all 3.)participating vendors. The independent third party is offering a useful service and poses no threat to the vendors.

The following conditions may have to be true for a third party to have an opportunity to play the role of an 1.)e-marketplace operator. No vendor in an industry is big 2.)enough to form an e-marketplace. There are big vendors, 3.) but they are not interested in operating an e-marketplace. There are big vendors, and some of them are interested in operating an e-marketplace.

However, since the big vendors are competitors in the same market against the small vendors, the small vendors cannot trust that the big vendor's e-marketplace would treat them fairly. Therefore, an independent third party may be preferred to offer the e-marketplace service.

This outside third party could be an Application Service Provider (ASP) who is experienced in developing front-desk and back office e-commerce operations. Instead of helping individual companies to set up e-commerce websites, this ASP could custom develop an e-marketplace for a group of vendors. The e-marketplace is like a mall which has built facilities such as air-conditioning, parking lots, security, etc., and which expects shop owners to lease a space there. Similarly, an ASP could develop an e-commerce platform including an inquiry system, order system, transaction system, and payment system, etc., and which expects vendors to set up their e-shops in this e-marketplace. The mall owner collects monthly rent from shop owners. Sometimes the mall may also charge a commission based on a certain percentage of a shop's revenue. The e-marketplace may follow exactly the same charging structure.

3.3. E-marketplace Organized by Several vendors in the Same Industry

Several big vendors of similar sizes may sponsor an e-marketplace. Since none of them is in a dominant position, there is a balance of market strengths. They may realize that by joining efforts to form an e-marketplace, there will be lower operations costs and more profit for all of them.

3.4. E-marketplace Operated by a Competing Vendor in

the Same Industry

A large vendor with brand name visibility and e-commerce capability on its website may want to expand its role and try to take the lead in becoming an e-marketplace. This large vendor may only invite other vendors whose products/services are complementary to its own to join this e-marketplace. The goal of this kind of e-marketplace is to become a total-solution provider so customers can enjoy “one-stop shopping.” The strategy of this e-marketplace is to increase the competitiveness for vendors within this e-marketplace and compete against the vendors outside of this e-marketplace.

This big vendor’s e-marketplace will be in competition with any other e-marketplaces. Similar to the competition in the brick-and mortar world, it really depends on the size of the market to tell how many e-marketplaces can co-exist.

3.5. E-marketplace Operated by a Complementary Vendor in the Same Industry

If the products or services provided by an institution are complementary to the products and services of other vendors, then this institution should pose no threat to the other vendors. Some unique services may include R&D, technical support, and consulting, etc., which are services needed by other vendors. This institution may be a candidate to operate an e-marketplace which will need the participation of vendors in this market.

4. THE E-MARKETPLACE OF TAIWAN REFRIGERATION & AIR-CONDITIONING PRODUCTS

4.1 The Suppliers of Refrigeration & Air-Conditioning Products/Services in Taiwan

According to the 2000 Yearbook of Taiwan Refrigeration & Air-Conditioning Products/Services, the total revenue of this industry is about \$3 billion US dollars (ITRI 2000), in which 60% belongs to the air-conditioning sector, and 40% belongs to the refrigeration sector. The revenues are expected to grow as the economy grows. Taiwan is the world’s fifth largest production region for small-sized air-conditioners. The number of suppliers in this industry is summarized in Table1.

Table 1.Categories and Number of Suppliers in Taiwan’s Refrigeration/Air-Conditioning Industry

Categories of Suppliers	Number of Suppliers
Licensed Refrigeration/Air-Conditioning Technicians	452
Licensed Electrical Technicians	265
Registered Refrigeration/Air-Conditioning Engineering Companies	1064
Registered Plumbing Engineering Companies	2454
Registered Refrigeration/Air-Conditioning Equipment Suppliers	402

Registered Freezer/Refrigeration Equipment Suppliers	358
Registered Ventilation Equipment Suppliers	441

Refrigeration/air-conditioning products are sold to residences, business offices, and commercial and industrial facilities. To come up with proper product design, vendors have to analyze different clients’ different needs. Because there is different equipment from different suppliers that has different performance characteristics, the users are often confused by the number of possible choices. To add another dimension of complexity, there are government’s stringent regulations, safety codes, and technical standards. Therefore, a client’s refrigeration/air-conditioning system often requires registered engineering companies to assist in design and registered technicians to install. In Taiwan, there are millions of clients, thousands of engineers/technicians, and hundreds of equipment suppliers in the refrigeration/air-conditioning market. The information flow among these parties is neither efficient nor effective. Clients do not necessarily get the best solution to satisfy their needs, engineers do not necessarily have knowledge about the latest available technologies and equipment, and equipment suppliers do not know who needs their products. All of these parties could be brought together on one website to increase the information flow.

4.2. The Services Provided by ITRI

The Energy Research Laboratory of the Institute of Industrial Technology Research (ITRI) in Taiwan conducts technology research and provides technical support to equipment manufacturers and engineers/technicians of the refrigeration/air-conditioning industry. ITRI maintains a large database of relevant information with respect to refrigeration/air-conditioning, including product specifications, national standards, government regulations, design rules and methodologies, construction/installation procedures, vendor lists, etc. In order to better manage the precious domain knowledge in this field, ITRI has decided to set up a website as a vehicle to deliver her services via Internet. Expanding the functions of the website to include e-marketplace functionalities seems to be a logical extension.

4.3. The Rational for ITRI Offering E-marketplace Services

As mentioned in the previous section, the Taiwan refrigeration/air-conditioning industry has a large number of equipment and service suppliers. Unfortunately, most of them are too small to benefit from web technologies, let alone conduct e-commerce via the Internet. Additionally, there is no dominant equipment manufacturer in this market. Consequently, there is no e-marketplace yet for Taiwan’s refrigeration/air-conditioning products/services.

Since ITRI is partially sponsored by government funding, one of its charters includes promoting Taiwan’s refrigeration/air-conditioning industry. Offering e-marketplace services will increase the efficiency of conducting business for all vendors, engineers, and clients.

Information of the latest R&D developments either by ITRI or from foreign sources can be circulated through the e-marketplace to improve the quality of the products and services provided by domestic refrigeration/air-conditioning vendors. Establishing a focused e-marketplace will also help expand the global visibility of Taiwan's refrigeration/air-conditioning equipment suppliers.

5.SERVICES PROVIDED BY THE REFRIGERATION & AIR-CONDITIONING E-MARKETPLACE

To help accomplish the strategic objectives at each stage the following services will be offered in several stages of the development of a refrigeration/air-conditioning e-marketplace. Different competitive strengths built up at different stages of the e-marketplace will win acceptance from the target industry.

5.1. Stage One

The most challenging objective of an e-marketplace at stage one is to win awareness and acceptance. The e-marketplace must provide value to equipment suppliers, service providers, and buyers, and pose no threat or cause suspicion among the suppliers so that they will willingly support and participate in the e-marketplace.

1. **Information Content:** The key contribution of a website is its capability to effectively distribute information of value to whomever needs it. The ITRI website will make the following public information available: technical standards, government regulations, news releases, reference articles, updates of the latest technological improvements, activity announcements such as conferences, seminars, and new product release, etc. Other information content may be free of charge to only e-marketplace members, or usage charges may be levied based on the type and volume of information retrieved. Examples include: technical specifications and guidelines, standard operations procedures, design rules and methodologies, technical or marketing reports, design software, etc.
2. **Website hosting service:** The e-marketplace leases storage space to host vendors' websites which basically present their products and services. ITRI can serve as an ASP to help design and implement websites for vendors, as well as to maintain these websites. The e-marketplace will also take advertising from vendors.
3. **Request For Proposals:** Designated areas for different product categories in the e-marketplace will allow buyers to pose their requests for proposals. Here they can reach a large group of potential suppliers very quickly, while suppliers are exposed to more business opportunities.
4. **Search Capability:** There will be keyword search capability to locate information on the e-marketplace. Buyers can search for product information; suppliers can search for buyers' needs; and all technical,

regulatory, and market information can be located at users' request.

5. **Directory Service:** The e-marketplace lists the names, addresses, expertise, products/services, etc., of all of suppliers/providers in the refrigeration/air-conditioning industry.
6. **Forums for User Groups:** Forums will be available for different subjects and user groups of special interests in the refrigeration/air-conditioning arena where people may raise questions or concerns and ask for advice. Those seeking partners for joint venture opportunities may also participate in these forums. Each user group will be a small community, and they will become the loyal buyers and sellers in this e-marketplace (Hagel & Armstrong, 1997).[3]

5.2. Stage Two

When most suppliers participate in this e-marketplace, most buyers are aware of this e-marketplace, and they all make use of information from this e-marketplace, the e-marketplace is ready to evolve into the second stage. At this stage, the e-marketplace does not need to be as cautious as in the first stage not to cause any resentment from the suppliers. The services that can be offered in the second stage are described in below:

1. **Evaluation Service:** The operator of an e-marketplace needs to establish its image by assuring the quality of the products and services offered in its e-marketplace. Even though the content on a vendor's website is its own responsibility, the e-marketplace could do what the Consumer Report does: perform impartial testing, verification, evaluation, or give ratings on the features and performances of vendor provided equipment and services as well as conduct client satisfaction surveys and keep the records for future reference.
2. **Price Bargaining:** The e-marketplace will promote its value to larger refrigeration/air-conditioning buyers in petro-chemical, textile, and electronic industries, etc. to invite them to purchase from the e-marketplace. Buyers consolidating their purchases can get more bargaining power. Commonly used and consumed products and materials for refrigeration/air-conditioning equipment like fans, pipes, filters, valves, thermometers, pressure gears, control gears, anti-freezer, insulator, etc., can get bulk rate discount if purchased from the e-marketplace. The e-marketplace will provide a mechanism for buyers of any product to consolidate their purchase orders and bargain for the lowest price.
3. **Expand Globally:** The e-marketplace will expand its reach to foreign suppliers and industrial purchasers to take the full advantage of worldwide connectivity of the Internet. However, the language barriers must be overcome. The e-marketplace must hire staff with foreign language capability who can translate Taiwan buyers' needs to foreign suppliers and translate

foreign buyers' request for proposals to Taiwan suppliers. This e-marketplace can serve as a bridge to bring Taiwan refrigeration/air-conditioning industry to the global market while global suppliers can also supply domestic needs.

5.3. Stage Three

The majority of Taiwan refrigeration/air-conditioning vendors are small companies which do not have a company website and do not use the Internet. In the third stage the e-marketplace operator starts by first bringing them onboard and giving them a presence in the e-marketplace and by sharing technical information and business opportunities with them. However, since their internal operations are far from computerized, they are not ready for on-line B2B transactions. Finally, a secure on-line system with electronic payment capabilities will be developed.

6. CONCLUSIONS AND RECOMMENDATIONS

Although e-commerce has faced setbacks due to over-investment and over-optimistic expectations, nevertheless, the efficiency and effectiveness of doing business via the Internet will undoubtedly stay and become more prominent. The refrigeration/air-conditioning industry in Taiwan is behind in this respect and requires leadership and clear direction. The Energy Research Laboratory of ITRI is in a unique position to play this role and operate an e-marketplace for this industry.

This paper studied the competitiveness and market positioning of such an e-marketplace, and further proposed a three-stage business strategy and corresponding service offerings for this e-marketplace. E-marketplaces in western countries have focused on on-line transactions and integration with enterprises' internal computer systems such as Enterprise Resource Planning and Supply Chain Management, etc. However, Taiwan refrigeration/air-conditioning e-marketplace should first start with dissemination of technical information and business opportunities to increase the efficiency of both the

suppliers and buyers. The electronic transaction functionality of e-marketplace has to come in the next phase.

This e-marketplace will serve as a driver to push Taiwan refrigeration/air-conditioning vendors' transition into the new digital economy. Although, it might take a few years to transform the industry structure, the payoffs for both the vendors and the e-marketplace will be big. Because the entry barrier for e-marketplace followers will be high, early investment and patiently bringing the vendors into the e-marketplace will be worthwhile in the long run. Taiwan suppliers and buyers in the refrigeration/air-conditioning industry will have revolutionized ways of conducting business via the Internet.

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