HANKEN – SWEDISH SCHOOL OF ECONOMICS AND BUSINESS ADMINISTRATION

ADOPTING SCM FOR SMES: A STUDY OF THE IMPACT FACTORS IN COLLABORATION WITH MULTINATIONAL COMPANIES

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Abstract:

Small- and medium-sized enterprises have played a very important role in China's economic growth during the past two decades. Given the fact of SMEs collaborating with multinational companies, the supply chain management (SCM), providing the right product to the right place on time with the least cost, is extremely important. However, due to the limited resources of SMEs, the adoption of SCM has been difficult.

This study aimed to investigate the impact factors influencing the SMEs' intention to implement supply chain management. I am planning to survey the 1st and 2nd tier suppliers of a sports and fitness company by the way of questionnaire, observations, on-site interviews, etc. The result of the Surveys will be analyzed to view the factors. At the end of this study, I am going to give the suggestions to SMEs for adopting or introducing SCM, in order to further develop the daily business processes more efficiently and make good use of new technologies.

Keywords: Small- and Medium-sized Enterprises (SMEs), Supply Chain Management (SCM)

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1. Introduction

Small- and Medium sized Enterprises (SMEs) have played a very important role in China's economic growth during the past decades. Given the fact that many SMEs collaborate with multinational companies, the effective coordination and efficient maintenance of inter-organizational information exchange channels are extremely important. The challenges have never been greater than those which SMEs currently face as a result of joining the supply chain management (SCM) to provide the right product to the right place on time with the least cost. Today, most of them are being forced to adopt SCM by their major customers in order to carry out every day business processes more efficiently. However, SMEs often do not have the time, skills, and resources to implement SCM. Therefore, the impact factors of adopting SCM for SMEs in collaboration with multinational companies are addressed in this paper.

SMEs represent a big number of total China's business. Although SMEs have greater flexibility because their size allows them to adopt new process, services, materials, and products more easily than large companies (Corman and Lussier, 1996), SMEs face the disadvantage of being less competitive as a result of inadequate financing and managerial ability. In recent years, raising wages, high-cost land and environmental protection awareness have altogether caused the China industries to be less competitive. Furthermore, the SMEs are lacking of resources to communicate with outside vendors, suppliers or customers that cause the manufacturers difficulty in staying competitive in the global marketplace. Many China manufacturers, as original equipment manufacture (OEM) factories, have experienced the

management of material, cash and information flows both in and between facilities. Individual businesses no longer compete as solely autonomous entities, but rather as part of a supply chain in the modern business (Lambert and Cooper, 2000). No single enterprise can maintain its market leadership without sharing information with upstream and downstream partners in the modern competitive and global marketplace.

Integrating the supply chain has become one of the most important issues in managing contemporary manufacturing to meet customers' demands: lower cost, better quality and services, as well as faster delivery. SCM has been one of the most important topics, and the companies are forced to invest in and focus on their supply chains because of short product life cycles and heightened customer expectations. And the increasing number of fortune 500 companies have managers with "supply chain" in their title, and there are more than one company has created logistical operations groups entrusted with "supply chain" functions (Ross, 1998). A famous sports and fitness company, spent US$400 million in SCM system (Nike Complaint Hits i2 shares, 2001). As a result of market globalization, the business enterprises are moving from solely operating processes toward more complicated and integrated decision making. Therefore, SCM is concerned with achieving cost-effective satisfaction through sufficiently integrate suppliers, manufacturers, warehouses, and stores, in order to produce and deliver the right products, and at the right time to the right consumers. The continuous development of SCM changes business operations and provides business opportunities and challenges to the SMEs.

Most organizations are members of multiple supply chains. An organization in each chain purchases material from various suppliers and sells a numbers

of products or services to multiple customers. The SMEs in China usually collaborate with the international buyers to perform their business. The adoption of SCM became necessary for China manufacturers who take orders form multinational companies in order to retain competitiveness and reach a global operation. The upstream relationship can be easily remained for a few tiers, but dealing with the original major suppliers is an enormous undertaking. The SMEs must utilize the computerized technology to communicate with suppliers and customers and to construct an environment for electronic transactions. Therefore, becoming a supply chain member is the way for enterprises to survive and to succeed in the new century.

With regard to impact factors, this research conducted on-site interviews, observations, questionnaire surveys of China's sports and fitness equipment manufacturers who collaborate with a well known multinational sports and fitness company, company XYZ as it's code name, in the U.S.. Data collection and analysis of survey is provided. According to the findings from survey results, suggestions are also provided to these companies regarding the adoption of SCM in the end of this paper.

2. Background and Rationale

2.1 Industrial Background

1n the 1980s, low labor costs and the open government policy attracted countries, such as Japan, U.S., and Hong Kong, to place orders in China. The labor-intensive industries, such as shoe, bicycle, textile, etc., began to lead the China economy.

Today, many companies are under constant pressure to enrich their

competitive capabilities by reducing product and operating cost, increasing process flexibility, and delivering products and services to market faster. Many of the manufacturers in China have not changed the role of being OEMs for multinational companies. Due to the fact of financial limitation and no brand building, many traditional SMEs still rely on orders placed from international companies. The traditional industries are already at the bottleneck stage and the market economy is suitable for applying the SCM to move to the next level.

However, the transformation from traditional manual processing to computerization is difficult to accomplish for SMEs because of their limited resources. The information systems of SMEs are not always compatible with the big multinational companies due to finances, IT skills, knowledge, and human resources constraints; therefore, implementing the supply chain management in SMEs is a complex and painful process. In the case we studied, the multinational company XYZ understood the difficulties when integrating the upstream suppliers into their supply chain management system; therefore, they skipped the linkage of information system with these SME suppliers during their beginning adoption of SCM. To cope with this problem, purchase order placing remained in overseas liaison offices in order to avoid the system incompatibility issues they might encounter. Besides, the upstream integration issue may not necessarily occur because a great number of the initial raw material suppliers are large multinational companies as well. This study will provide a close look at company XYZ's 1st and 2nd tiers' upstream suppliers and will investigate the factors of SME suppliers adopting SCM.

2.2 Supply Chain Management

2.2.1 The Definition of SCM

In the past, the marketing strategies, sales volume and finance capability are considered much more important than the production and distribution of products and information through the marketplace. Today, the global operations and supply chain are becoming increasingly significant and receiving considerable attention. Many companies are no longer to succeed or fight alone, but are gaining access to whole channel alliances. Companies must work across enterprise boundaries and improve the channel system to reduce product and operation costs, increase process flexibility, and deliver products and services to market faster.

The global supply chain forum (GSCF) defines SCM as follows: (Lambert and Cooper, 2000)

Supply chain management is the integration of key business process from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.

The supply chain encompasses all activities associated with the flow and transformation of goods from the raw materials stage, through to the end users, as well as the associated information flows. (Handfield and Nichols, 1999). Although whoever has the relationship with the end user has the power in the supply chain, managing the entire supply chain shown in Figure 1, the focal company integrates and manages process links with tier 1 customers and suppliers (indicated by the spotted area). As indicated by the remaining solid lines in Figure 1, the focal company is actively involved in

the management of a number of other process links beyond tier 1. (Lambert and Cooper, 2000)

In China, a majority of SMEs collaborate and receive orders from major multinational companies, i.e., the focal companies, such as the footwear, sports, and fitness industries. The relationship between the 1st tier suppliers and the focal company is developed by mutual agreement that the 1st tier suppliers are willing to meet the policies the focal company enforces (McIntyre and Perlman, 2000). These enforcing regulations play an important role to upgrade the 1st tier suppliers' operation and to achieve mutually beneficial results. Moreover, the focal company maintains its brand value by carefully managing the 1st tier manufacturers. Though the 1st and 2nd tier suppliers rely on the focal company's orders, the focal company usually mandates the operation process of the 1st tier manufacturers, such as the interface protocol. Managing the relationship between 1st and 2nd tier's suppliers is another critical subject of the SCM to determine the success of the chain management regardless of those suppliers are also supplying to competitors simultaneously. In 1999 the focal company XYZ implemented the supply chain management to reduce product cost and delivery time, and to allow the products to be introduced to the market faster. The 1st and 2nd tier suppliers of company XYZ, the shaded area in Figure 1, will need to adjust their strategies, invest in information systems, and reengineer their organizations in order to fit into the chain and adopt SCM successfully.

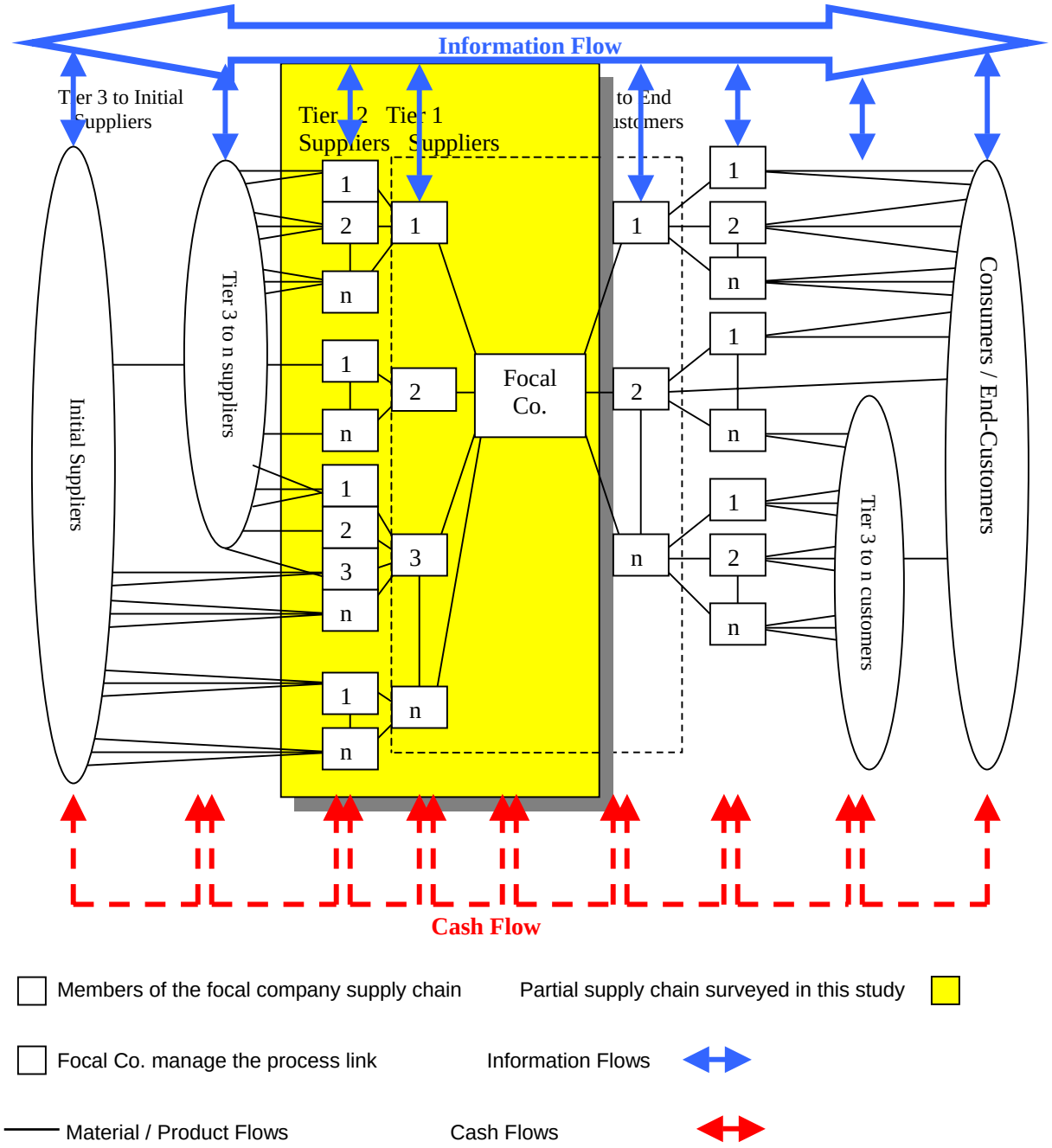


Figure 1. Integrated Supply Chain Model
(Source: revised from Lambert, 2000)

2.2.2 Information Sharing in Supply Chain

The information flow of the supply chain is depicted in Figure 1, indicated by bold arrows on the top. The information is available to any participants within the chain and the feedback loop defining an integrated system. The ideal supply chain allows just-in-time deliveries to occur between every linkage of the chain to minimize the inventory and respond to fluctuations effectively and in a timely fashion. The data transfers throughout the supply chain concurrently when sales occur. The managers in each chain plan capacity, allocate materials, and notify suppliers throughout the supply chain coordination. The information flow also provides a quick payment system for supply chain members, inter-organizational payments via electronic funds transferring, which generate the cash flow indicated in Figure 1, the dotted arrows. Thus, the information system is designed to permit accessibility, to improve decision-making, and to respond quickly.

The information systems and the technologies link the organizations of a supply chain into a unified and coordinated system. Procter & Gamble (P$G) became involved in successful supply chain-type relationships because of utilizing and sharing the information with one another. Through a series of agreements with giant retail customers, P&G has made a major commitment to the development of dedicated customer teams to facilitate the sharing of information between the firms. (Handfield, 1999).

The need for virtually seamless bonds information system within and between organizations is essential because accurate and timely information is critical for a successful supply chain (Handfield, 1999). In some cases, the

information system from the focal company down to the wholesalers and retailers is usually more thorough than to the upstream supplier. For example, company XYZ, which revised its SCM implementation to focus on downstream wholesalers and retailers rather than its upstream SME suppliers. Nevertheless, these upstream suppliers need to prepare themselves in terms of IT skills, information technology, management style, and the staff trainings to be ready for adopting the supply chain in the near future.

2.2.3 Supply Chain Partnership Formation

The flows of information, cash and material across the supply chain are unlikely to success unless a sound and effective inter-organizational relationships have been developed. Even though sufficient resources to commit to the supplier integration process is important, the information sharing is usually carried differently from one culture to another. Yet information sharing has been a barrier in the Chinese culture as opposed to the SCM in practice. In the case studied in this paper, it seems hard to build up a trusting supply chain among the suppliers of company XYZ. The information was not easy to disseminate, and the biggest complaint from the upstream suppliers was their piled-up inventories when rolling into company XYZ's SCM.

Two parties breaking down the boundaries and working together to create mutual benefit through the supply chain is the key to managing the supply chain. Most of the multinational companies have their unique assessments to evaluate and select a proper supply partner. The selection of the right supply

chain partners is the most important outcome of the sourcing process. However, willingness to participate in the design process, including the ability to reach agreements on intellectual property or confidentiality issues is very important. We must also take into account the cultural differences and the understanding that people behave in their own interests. Thus, trust building and greater information sharing between parties need to be exercised. The focal company should carefully manage supply chain information sharing to assure all partners' interests will be protected.

2.3 Overview of (SMEs)

2.3.1 The Definition of SME

In all countries, SMEs play a very important role and have made great contributions to new industrial job creation, the economic growth and technological progress. The criteria for defining an SME usually vary because the economic development, industry structure and development direction in each country are different. An SME is usually defined by the number of employees; however this number varies from country to country. For example, in Singapore and Hong Kong, only firms with less than 50 staff were included, but a Canadian study included organizations with staff numbers of up to 200 employees. (Fink, 1998)

There are four indicators of SMEs criteria: the (industry) category, capital stock, amount of operating revenue and the number of regular employees (Statute for Development of Medium and Small Business, China.). The definition often used for SME in China for manufactures is capital stock not exceeding RMB18.4 million (about US$2.3 million) or the number of

regular employees is less than 200. In the U.S., SMEs, with fewer than 250 employees represent 98% of America's eighty million businesses and are becoming the backbone of the worldwide manufacturing sector (Dumaine, 1992). Table 1 illustrates the consolidated figures of SMEs among China, and Hong Kong.

Table 1. SMEs Figures

	No. of SMEs	SME%*	Annual Revenue %**	Job Creation
China	8+million	99%	40%	109 million
Hong Kong	0.29 million	98%	--	--

(Source: http://www.chinasmb.gov.cn/mcti/index.jsp
http://www.infor.gov.hk/tid/chinese/support/fullreport/summary.htm
Consolidated by this study)

Furthermore, SMEs make up 90% of the APEC (Asian-Pacific Enterprise Cooperation) membership and 80% of the workforce (24). It is easy to conclude that SMEs play a key role in most countries and in today's economy. The organizational structures of SMEs are less complicated, which has given them the real advantage of higher responsiveness to the global marketplace. However, due to their small scale and limited resources the SME are unable or not willing to implement the SCM. Large companies are using electronic commerce to enhance the supply chain, with the SMEs being left behind (Gore, 2001). Now the SMEs are pushed by their customers and suppliers to implement new technologies to operate their daily business. To reach a global operation and highly effective service, SMEs need to roll into the supply chain and utilize information technology to connect with suppliers and customers.

2.3.2 The Current Manufacturers' Information System in China

The average annual investment on information systems for each enterprise is about RMB0.12 to 0.24 million (US$ 15,000 to 30,000) (The R.O.C. Information Industry Yearbook, 1997). Sixty-five percent of all the enterprises spent less than 0.5% of their revenues to invest in computer related products (The R.O.C. Information Industry Yearbook, 1997). In addition, the information system investment for each of China's top 950 manufacturers (with average annual revenue of RMB172 million or US$21.5 million) is RMB0.344 million (about US$43,000)(Chen, 2000). In 1999, out of China's top 950 manufacturers, there were only less than half manufacturers who implemented ERP (Enterprise Resource Planning) systems (Chen, 2000). The information system is functioning in isolated businesses rather than integrating into the enterprise's resource planning for most of the manufacturers. In addition, China manufacturers have had difficulty cultivating technical personnel knowledgeable in information gathering and sharing, and they have had reservations about investing in research and development.

According to Liu, et. Al., 1997, it is concluded that about 93% of the Fortune 500 companies display their products and services on their websites, and about 26% them provide some type of online business with their customers through their websites. A survey of 1200 companies in the U.S. and Europe was conducted by Dell Corporation in 2000. The result was that 74% of the enterprises' websites provide product information, 50% of the sites enable electronic commerce, 44% of the sites are able to notify order

status, and only 26% of the surveyed companies continuously updated supply demand online.

The Internet has made powerful impacts on marketing practices. However, the difficulties of implementing electronic related technologies in China include a shortage of IT professionals (40.58%), lack of cooperation between upstream and downstream suppliers (39.91%), and lack of EDI standard protocol (39.6%), according to the report of "Automation and the Level of Implementing Electronic Commerce of China Manufacturers" (MOEA, 2000). Figure 2 provides the statistical figures of the difficulties when China enterprises implemented electronic related technologies.

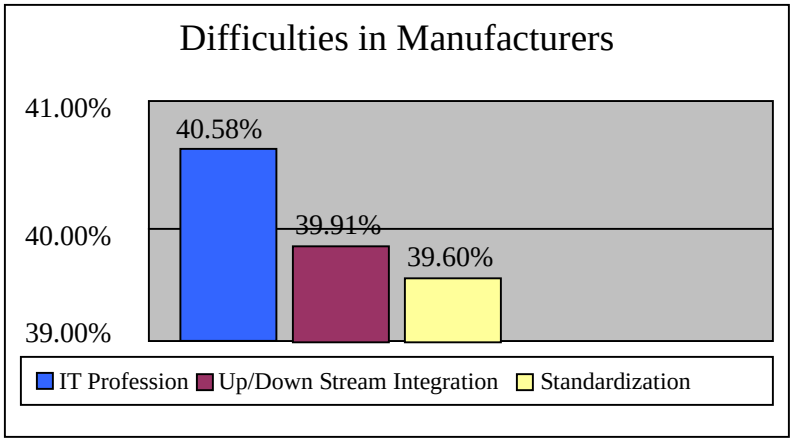


Figure 2. Difficulties of Implementing Electronic Related Technologies
(Source: Report of Automation and the Level of Implementing Electronic Business of China Manufacturers, MOEA, 2000)

According to the report of "Automation and the Level of Implementing Electronic Commerce of China Manufacturers" (MOEA, 2000), out of 77.07% returned surveys, 41.64% manufacturers are using the Internet. Out of these 41.64% manufacturers, there 92.47% of manufacturers using e-mails to communicate with their suppliers and customers, which represents the highest percentage of Internet application. Figure 3 provides the SMEs'

communication application in China.

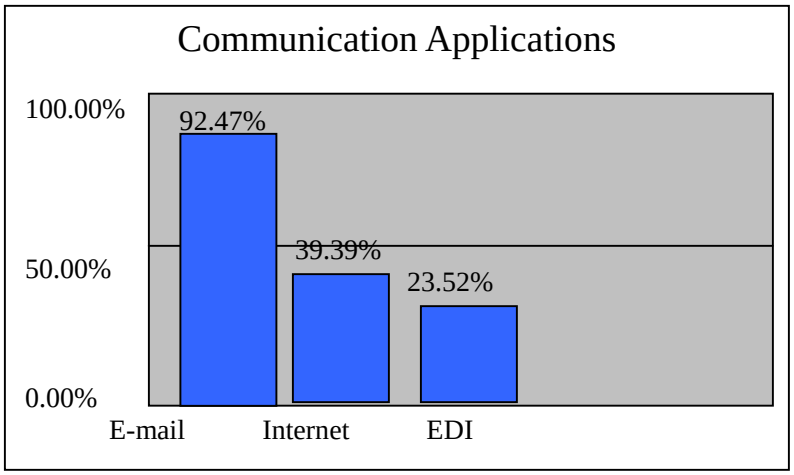


Figure 3. Different Type of Applications For Manufacturers Communicating with Suppliers and Customers
(Source: Report of Automation and the Level of Implementing Electronic Business of China Manufacturers, MOEA, 2000)

With regards to electronic commerce applications, 39.71% of the manufacturers are equipped with some extent of electronic related technology (39.71%). Out of these 39.71%, there are 17.91% of manufacturers who have adopted SCM. Figure 4 provides the electronic commerce related applications are in the beginning stage, such as Internet and intranet infrastructure building.

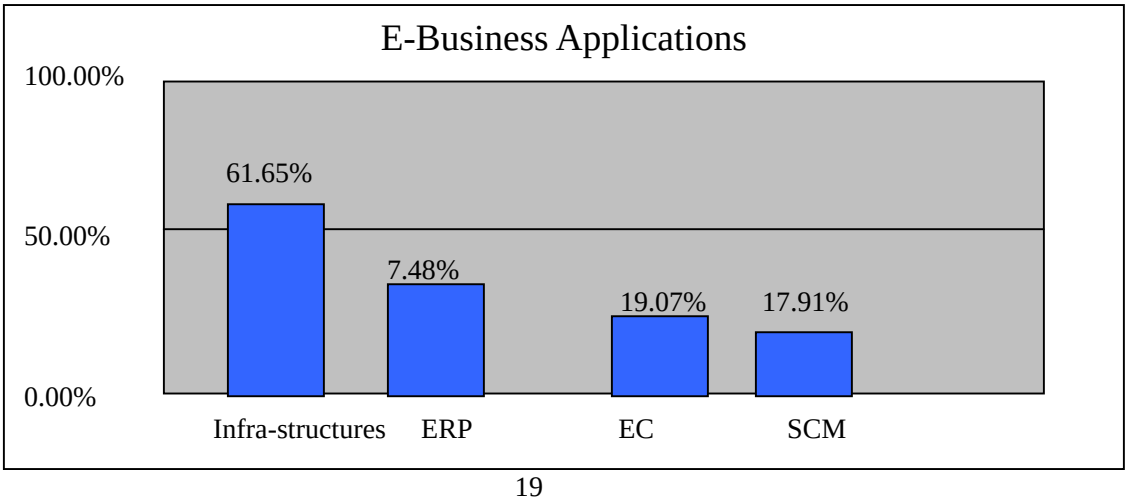


Figure 4. Electronic Business Applications in Manufacturers
(Source: Report of Automation and the Level of Implementing Electronic Business of China Manufacturers, MOEA, 2000)

Furthermore, out of 1,266 valid samples (3,859 samples returned), 36.81% of the surveyed manufacturers planned to implement SCM within two years. Figure 5 provides the China manufactures' two-year plan in implementing electronic related technologies.

3. Questionnaire and Data Collection

The difficulties of introducing the supply chain in traditional SMEs are numerous because of the limited financial and human resources, leadership, culture, low investment in computerization and information systems, and the constraint of the organization's structure. The research objectives are as follows:

1. Analyze demographic data of company XYZ's 1st and 2nd tier suppliers, including capital stock, information system, computer literacy, and management style.

2. Analyze and determine the impact factors of adopting SCM for China traditional sports and fitness equipment SMEs through their leadership, organization, strategy, human resource function, and other factors.

3. Propose suggestions to eliminate barriers when implementing SCM.

A questionnaire was developed to collect data; and it was evaluated to

pinpoint which factors of each segment were critical to the adoption of SCM when collaborating with multinational companies. The following sections will describe the methodology, the questionnaire development, and the method of data collection.

The research methods employed in this study were both quantitative and qualitative. The quantitative method was conducted by mailing out questionnaires in order to collect SME's subjective opinions on implementing new systems and interests in adopting SCM. The questionnaires were designed and based on literature review as listed on Table 2. The qualitative results were achieved by on-site interviews and observations. The conclusion and suggestions will follow.

3.1 Questionnaire development

The questionnaire, which contained 75 questions, was divided into four main sections: the general information of companies (10 questions), computer facility information, current operation status and system implementation experience (34 questions), the impact factors of adopting supply chain management (27 questions), and the respondents' demographic data (4 questions).

Section I asked about the general information including company capital stocks, history, overseas subsidiaries, number of employees, annual revenues and expenditures to generate the demographic data on the studied suppliers. The percentage of purchase orders received from the studied focal company was also asked to determine the correlations with the suppliers' intention of

joining the supply chain.

Section II covered the information related to the use of computer facilities (hardware, software and information systems), information technology personnel and experiences, expenditures on computer facilities to obtain the computerized information and computer literacy of each supplier, the current operating status questions were based on the ideas described in implementing supply chain management in Ross (1998) that were asked to evaluate if the company is competitive and the imperativeness of adopting SCM. It also asked about the respondent's opinions toward previous system or policy implementation.

Section III included six dimensions created to investigate the impact factors of adopting SCM. The respondents were asked to determine the importance of each factor when implementing SCM successfully. All the factors and related questions listed in Table 2 are supported from numerous references.

Section IV was designed for the demographic data of the respondents, such as position, age, computer background, and experience.

Respondents were asked to check appropriate items for each question. In order to assess the subjective opinions of the respondents in Section II and III, a 5-point Likert Scale rating was used to measure the importance of the factors to these respondents. In addition to rating on a scale, respondents were asked to rank the priority in Section III to accurately reflect the importance of each factor.

The questionnaires were sent directly to the top managers (with 86.7% in return) or key contacts of company XYZ. Some phone calls followed

regarding the questions and personal opinion.

Table 2. Question dimensions, related questions and supporting references

Dimension	Question	Reference
Benchmark SCM performance & potential improvement	6.1 Company has reduced cycle times and pipeline inventories by at least 50% over the past 3 years	Ross (pp.352-353)
	6.2 Company production and transportation cost have declined by 20% or more over the past 3 years	Ross (pp.352-353) Thomas et.al.(p.12), Waller (p.502)
	6.3 Company's cost of quality has declined by 50% over the past 3 years	Ross (pp.352-353)
	6.4 Company can claim at least 98% customer order on-time delivery and reliability	Ross (pp.352-353), Ghosh et.al. (p.209)
Supply chain status	7. Company's intention and current supply chain management implementation status without considering Company XYZ	This study
Experience of current operation management (such as implemented a system or adopted a policy)	8.1 Company deployed a project team with fully authorization to operate	Banfield (p.108 & 117)
	8.2 Company adopted "Pilot Team" (means selected one department to implement first, then evaluated and improved the process before implementing to whole company)	Banfield (p.82 & 83) Ghosh et.al. (p.209) Fink (p.246)
	8.3 Top management committed and participated in every single process	Banfield (p.69,80 & 108), Ross (p.350), Hsu (p.35cl), Fink (p.245&246), Ghosh et.al. (p.209)

	8.4 Company provided each project related employees with proper training.	Banfield (p.69&77), Hanfield (p.174) Ross (p.336), Fink (p.245), Duffy et.al. (p.432&435), Casati, et.al. (p.73)
	8.5 Company hired outside consultant and the services it provided were a great help.	Banfield (p.90&91), Hanfield (p.174), Fink (p.244-246), Hira (p.225)
	8.6 Company sought to form close and trusting, mutually beneficial relationship with system providers.	Banfield (p.108&113), Ross (p.352), Fink (p.246), Thomas et.al. (p.2), Ghosh et.al. (p.209), Casati, et.al. (p.73), Hira (p.225)
	8.7 Company's inter-departmental communication was more difficult than intra-department.	Banfield (p.108&113), Duffy e. al. (p.435)
	8.8 Everyone agrees on the new system implementation being success.	Banfield (p.69,88,108), Duffy e. al. (p.435)
	8.9 Company was constantly in the process of assessing pros and cons of their projects and providing feedback on information to improve the system performance.	Banfield (p.69,90,&96), Ross (p.336,348,349&352), Duffy et.al. (p.436)
	8.10 In general, the implementation was successful.	This study
Personal opinion regarding SCM	9.1 Your company management perceives SCM as purely an extension of material management, logistic management, etc.	Ross p.351
	9.2 Your company management perceives SCM has relatively little impact on strategic business, company operation, or marketing planning.	Ross p.351

	9.3 Your company intends to implement SCM and rolls into E-commerce simultaneously, since SCM is another format of B2B.	Ross p.351 , Hira (p.227)
	9.4 Most of corporations in the same filed implemented SCM (or E-commerce), therefore the orders will be lost if not implementing it.	Fink (p.246)
Section III		
Awareness of SCM	Have you ever heard or known about any success or failure cases of implanting supply chain management?	This study
	Will the above case influence your intension on adopting SCM?	This study
A. Leadership:	1. Top managements are fully understood and support.	Banfield (p.69,80&108), Ross (p.350), Hsu (p.35cl), Fink (p.245&246), Ghosh et.al. (p.209)
	2. Top managements are directly involved with the project and are actively engaged with the team in each process.	Banfield (p.69,80&108), Ross (p.350), Hsu (p.35cl), Fink (p.245&246), Ghosh et.al. (p.209)
	3. Define clearly; and all managers down to first-level supervisors, are clear about the corp. strategy or changes, and knowing what need to be done.	Banfield (p.89&119),
	4. Managers are able to assign adequate resources and give right directions, such as authorization or training, before implementation.	Banfield (p.88&89), Ghosh, et.al. (p.209)

B. Organization values:	1. Corp strategic processes are flexible, therefore, is capable to confront organization reengineering.	Lambert&Cooper (p.73), Fink (p.244), Ghosh et.al. (p.209), Duffy et.al (p.436)
	2. Corp. organization is modified and made a proper change to adjust to the requirements of SCM implementation.	Banfield (p.87&88), Thomas et.al. (p.8&12), Duffy et.al (p.436)
	3. Company normally in the forefront in utilizing new technologies for competitive advantage.	Banfield (p.87), Ross (p.348&351), Duffy et.al (p.436)
	4. The culture of the company continuously creating new opportunities and new business.	Ross (p.351), Fink (p.436), Thomas et. al. (p.8),
	5. No communication gap between any departments in the company.	Banfield (p.89&108), Ross (p.345), Fink (p.246), Casati, et. al. (p.73), Ghost, et.al. (p.209), Thomas et.al. (p.2&12), Hira (p.225)
	6. Company inherits experience and knowledge sharing.	Banfield (p.86&121), Ghost et.al. (p.209), Thomas et.al. (p.12), Duffy et.al (p.435)
C. Company strategies:	1. Gaining the supports and building the trusty among supply chain partners.	Banfield (p.108&113), Ross (p.352), Fink (p.246), Casati, et. al. (p.73), Ghost, et.al. (p.209), Thomas et.al. (p.2&13), Hira (p.255)
	2. The purpose of implementing SCM is to improve competitiveness and become international.	Ross (p.351&344), Fink (p.246), Ghost (p.209)
	3. After completing the implementation plan, provide thorough plans and timetables to employees.	Ghost, et.al. (p.73)

	4. Company is willing to share information after implementing supply chain to achieve mutually beneficial result.	Ross (p.352), Fink (p.246), Hira (p.225), Nahmias (p.339)
	5. Implement supply chain management to secure the orders.	Fink (p.246)
D. Human resources:	1. Employees follow the implementation plan step by step in the implement process.	Banfield (p.108&117), Fink (p.246)
	2. Communicate the business reasons for the change and the expected outcome to employees to minimize the resistance and comfort the employees.	Banfield (p.11,69,88&89), Ross (p.174), Duffy et.al. (p.435)
	3. During the implementation, proper training is provided for the medium and high-level managers.	Banfield (p.69&77), Hanfield (p.174), Ross (p.336), Fink (p.245), Duffy (p.432&435), Casati, et. al. (p.73)
	4. During the implementation, proper training is provided for the lower level managers and workers.	Banfield (p.69&77), Hanfield (p.174), Ross (p.336), Fink (p.245), Duffy (p.432&435), Casati, et. al. (p.73)
	5. Company's IT persons have good ability and skills.	Fink (p.244), Ghosh et.al. (p.209),
	6. Outside consultant's help.	Banfield (p.90&91), Hanfield (p.174), Fink (p.244-246), Hira (p.225)
E. Assessment:	1. Set up short-range goals and checkpoints with realistic objectives.	Banfield (p.69), Ross (p.336&352), Duffy et. al. (p.436)
	2. Whether company is continuously in the process of assessing the pros and cons of their SCM project.	Banfield (p.90,96&123), Ross (p.348&349)
F. Others:	1. New system is not incompatible to the old system	Hsu (p.35), Fink (p.244), Hira (p.255)

	2. The company has sufficient financial support.	Banfield (p.69), Ross (336), Fink (p.243&246), Gosh et.al (p.209)

3.2 Question Dimensions

In Section III, six dimensions--leadership, organizational values, company strategies, human resources, assessments and others--are designed to determine the impact factors when adopting the SCM.

A. Leadership

As an adoption issue, the respondent is asked to determine the importance of top managements' support and engagement in the adoption of SCM. This section also asks the respondent to determine the importance of clear direction and adequate resources assigned. The questions are based on the ideas described in the developing strategy of SCM in Banfield (1999), coordinated SCM in Thomas et. al. (1996) and other references. (Please refer to Table 2.)

B. Organizational values

As an adoption issue, the respondent is asked to determine the importance of the flexibility of corporation processes, re-organization, and reengineering processes. The other questions in this section focus on organization culture, such as if the enterprise is in the forefront of utilizing new technology, and if continuously creating new business technology is important. Finally, the respondent is asked to determine the importance of communication and experience sharing across the departments. The questions are based on the

ideas described in the competing through SCM in Ross (1998), the key success factors in Ghosh et. al. (2001) and other references. (Please refer to Table 2.)

C. Company strategies

As an adoption issue, the respondent is asked to determine the importance of building trust and sharing information in SCM. In addition, the respondent is asked to judge the importance of providing an adoption plan and timetable, and then determine if it is important to secure the orders by implementing SCM. The questions are based on the ideas described in the guidelines for the successful adoption of IT in SMEs in Fink (1998), competing through SCM in Ross (1998) and other references. (Please refer to Table 2)

D. Human resources

As an adoption issue, the respondent is asked to determine the importance of employees following the adoption plan step by step and communicating with employees to minimize the resistance. The other questions emphasize the importance of proper training for different levels of employees. This section also asks the respondent to determine the importance of the IT staffs' skills and a good outsourced consultant. The questions are based on the ideas described in the developing strategy of SCM in Banfield (1999), the introduction to SCM in Hanfield (1999) and other references. (Please refer to Table 2.)

E. Assessments

As an adoption issue, the respondent is asked to determine the importance of assessing short-range goals and also consistently assessing the strength and

weakness of their strategies. The questions are based on the ideas described in the developing strategy of SCM in Banfield (1999), in the competing through SCM in Ross (1998) and other references. (Please refer to Table 2.)

F. Others

As an adoption issue, the respondent is asked to determine the importance of the new system being compatible to the old system. The importance of sufficient financial support is asked as well. The questions are based on the ideas described in the guidelines for the successful adoption of IT in SMEs in Fink (1998), in the competing through SCM in Ross (1998) and other references. (Please refer to Table 2.)

3.3 Data Collection

Regarding company XYZ, China Liaison Office, 18 manufacturers of the 1st tier suppliers were selected in this survey and 22 suppliers in the 2nd tier were selected from different industry fields and covered different sizes. This study collected the primary data by questionnaires that were sent out either e-mails or regular mails in December 2003, and were collected within three weeks and analyzed for related statistical data. This study received 17 in replying from 1st tier and 20 from the 2nd tier suppliers. The return rate was 92.5%. There were 30 valid questionnaires, 15 in 1st tier and 15 in 2nd tier, after dropping the incomplete ones that made the return rate of valid samples 75%.

4. DATA ANALYSIS

Respondent’s demographic data:

Questionnaires were sent out to top managers or key contacts of the 1st and 2nd suppliers and 86.7% returned surveys were from manager's level and above (Figure 5).

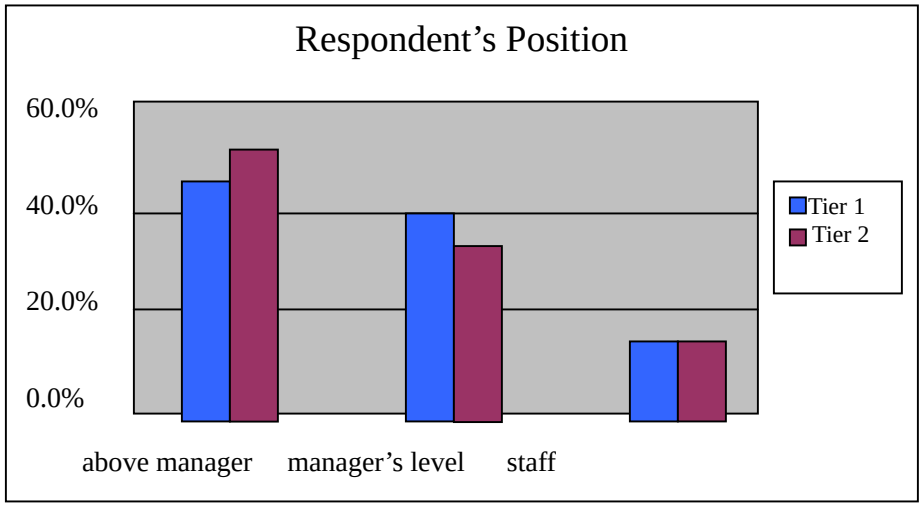


Figure 5. Position Distribution of the Respondents

50% of the respondents have worked for the same company for more than ten years and know the industry very well (Figure 6)

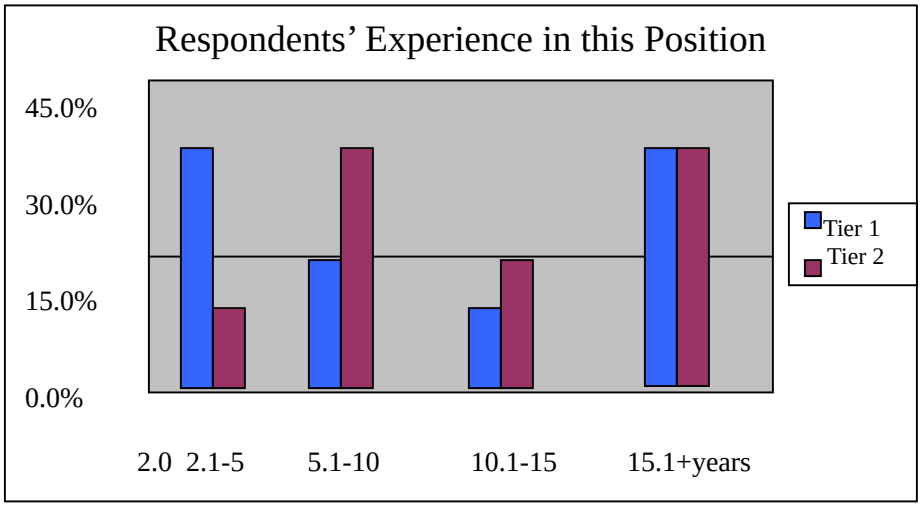


Figure 6. Respondent's Experience in this position

Section I: General information of the surveyed company

Question 1 to 5 asked about the company's capital stocks, history, overseas subsidiaries, number of employees, annual revenues and expenditures. The result shows that 43.3% of the surveyed suppliers are registered with capital stocks of less than RMB4.6 million (Table 3), which fall into the SME's definition.

Table 3. Capital Registered

(unit:millionRMB)	1st tier	%	2nd tier	%	Total	%
Below 1.5M	0	0.0	1	6.7	1	3.3
1.5-6M	4	26.7	8	53.3	12	40.0
6-12M	4	26.7	1	6.7	5	16.7
12-18M	1	6.7	2	13.3	3	10.0
Above 18M	6	40.0	3	20.0	9	30.0
Total Suppliers	15	100.0	15	100.0	30	100.0

73.4% of surveyed suppliers have fewer than 200 employees (Table 4) in China, which fall into the SME's definition.

Table 4. Employee Numbers in China

(unit: person)	1st tier	%	2nd tier	%	Total	%
Below 50	6	40.0	8	53.3	14	46.7
51-100	7	46.7	1	6.7	8	26.7
101-200	0	0.0	0	0.0	0	0.0
201-499	1	6.7	4	26.7	5	16.7
Above 500	1	6.7	2	13.3	3	10.0
Total Suppliers	15	100.0	15	100.0	30	100.0

A majority of the suppliers (83.3%) do not have subsidiaries overseas (Table 5). For those who have the subsidiary overseas, presumably due to the lower

labor cost, cheap land and the potential business expending.

Table 5. Supplier's Overseas Subsidiary

(unit: supplier)	1st tier	%	2nd tier	%	Total	%
Thailand	1	6.7	0	0.0	1	3.3
Indonesia	0	0.0	0	0.0	0	0.0
Philippians	1	6.7	0	0.0	1	3.3
Vietnam	3	20.0	0	0.0	3	10.0
U.S.	1	6.7	1	6.7	2	6.7
none	12	80.0	13	86.7	25	83.3

The overseas subsidiaries for the company are relatively new compare to their China head office. Therefore, the overseas workers' experience is skewed toward the low end, as shown in Figure 7.

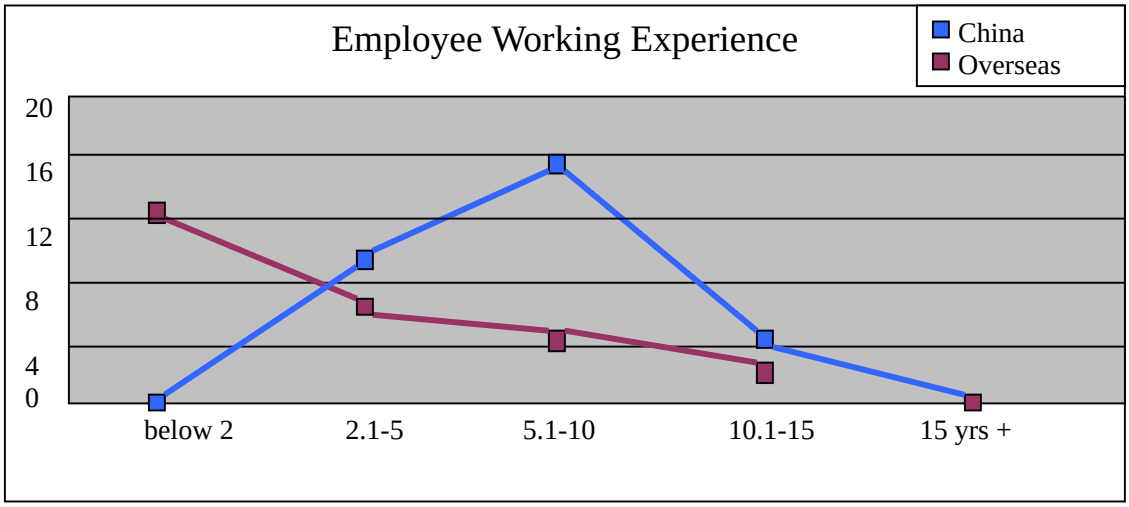


Figure 7. Employee Working Experience

Question 6 asked about the purchase orders received from company XYZ. There are only 10% of the supplier who get more than 50% of their total orders from company XYZ (Table 6). On average, both the 1st and 2nd tier suppliers get less than 50% of their total orders from company XYZ, and tier 2 get fewer orders than tier 1 (Figure 8).

Table 6. Orders from company XYZ

	1st tier	%	2nd tier	%	Total	%
Below 10%	3	20.0	8	53.3	11	36.7
11-20%	5	33.3	5	33.3	10	33.3
21-50%	5	33.3	1	6.7	6	20.0
51-70%	2	13.3	1	6.7	3	10.0
Above 71%	0	0.0	0	0.0	0	0.0
Total Suppliers	15	100.0	15	100.0	30	100.0

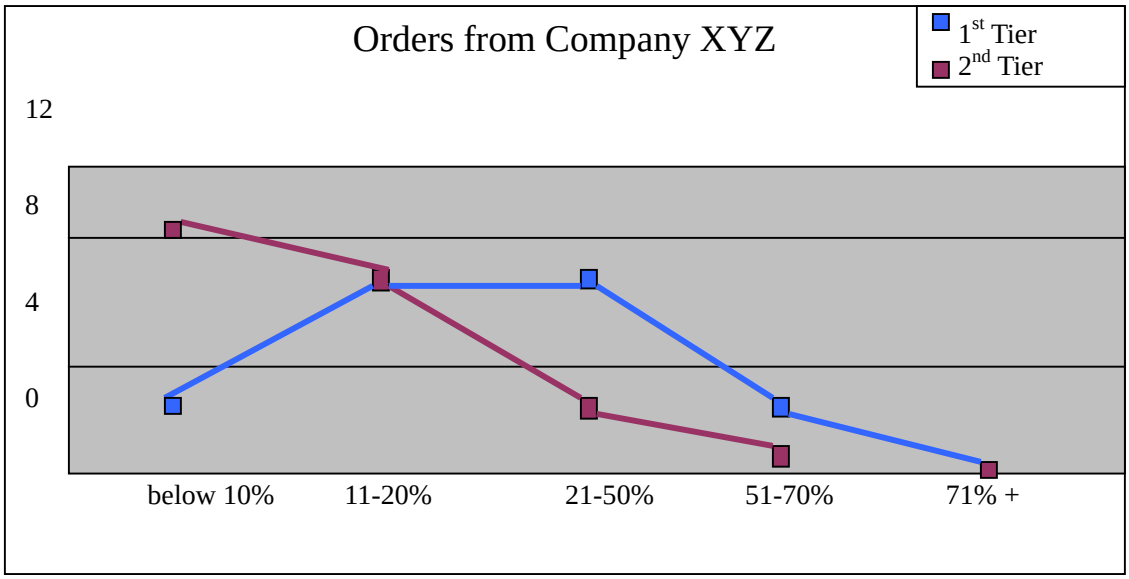


Figure 8. Orders from Company XYZ

Section II asked about the computer related information, current operation performance and prior experience in implementing a new system or a policy.

Computer related information:

Question 1 covered the use of computer facilities, such as hardware, software and Internet applications, computer literacy, and information technology (I.T.) personnel and experiences. 96.7% of the suppliers have personal computers as shown in Table 7. There is only one supplier still processing manually because it is a small supplier (with less than RMB115000 capital stock registered) and the owner does not see the need of computerized processing yet. This supplier retains the flexibility of taking mass customized orders with a good reputation for quality and short turn around time.

Table 7. Personal Computer Distribution

	1st tier	%	2nd tier	%	Total	%
0	0	0.0%	1	6.7%	1	3.3%
01-10	2	13.3%	3	20.0%	5	16.7%
10-25	5	33.3%	4	26.7%	9	30.0%
26-50	3	20.0%	5	33.3%	8	26.7%
Above 50	5	33.3%	2	13.3%	7	23.3%
Total Suppliers	15	100.0%	15	100.0%	30	100.0%

97% of the suppliers are using e-mails to communicate with other parties (Table 8). This result is consistent with the findings in the Report of MOEA (see Figure 3), showing that 92.47% of the surveyed manufacturers were using e-mail to communicate with upstream and downstream suppliers. 60% of the suppliers have their own .com websites. Regarding the other computer related information, most of the suppliers have basic computer equipment and utilize to some extent basic computer skills, as listed in Table 8. There is not much different between 1st and 2nd tier suppliers in software application, information system and Internet application.

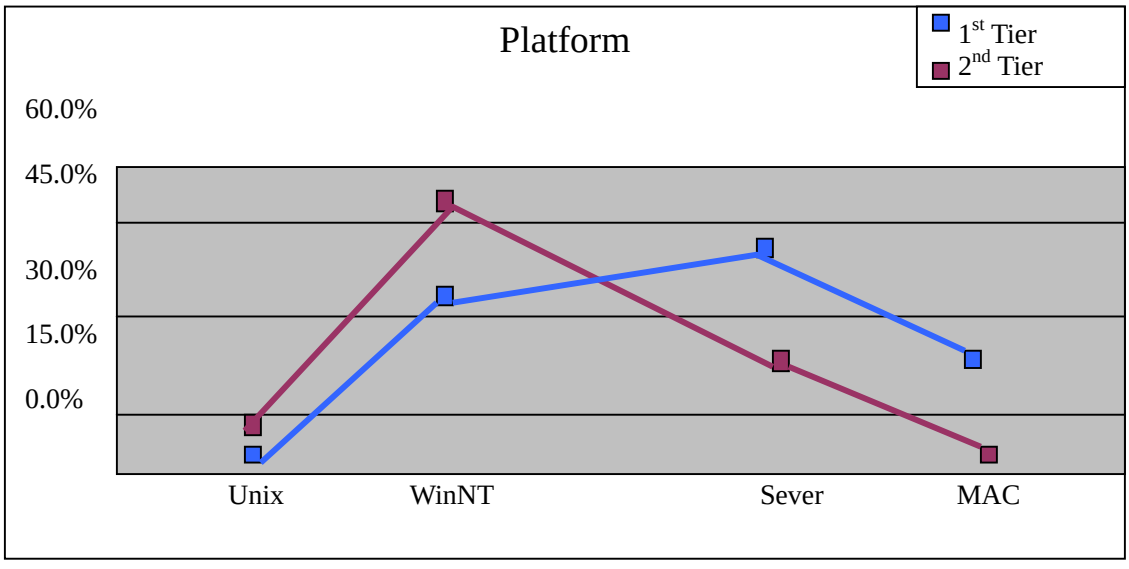
Based on current practices in company XYZ, all of the 1st tier manufacturers are able to communicate via e-mails, but the web-based applications are not yet popular. For example, the manufacturers are still not willing to download the graphic files from the website; instead, the graphic is usually transmitted to the manufacturers by burning it into CDs. Although the web-based download is available, they are reluctant to learn the new technology and constraint by bandwidth. However, instead of utilizing the Internet, the suppliers continue to operate in the traditional way to provide products or services.

Table 8. Computer Related Usage

		1st tier		2nd tier	
Platform	Unix	1	6.7%	2	13.3%
	Win NT	8	53.3%	8	53.3%
	Sever	10	66.7%	4	26.7%

	MAC	5	33.3%	1	6.7%
Software Application	Word Processing	15	100.0%	13	86.7%
	Spreadsheet	15	100.0%	12	80.0%
	CAD/CAM	4	26.7%	6	40.0%
	Photoshop, etc.	12	80%	8	53.3%
Information System	Finance/Accounting	15	100.0%	13	86.7%
	Inventory	10	66.7%	12	80.0%
	Production	8	53.3%	9	60.0%
	Sales	10	66.7%	9	60.0%
	Salary Admin.	11	73.3%	9	60.0%
	QC/QA	4	26.7%	5	33.3%
Internet Application	E-mail/Internet	15	100.0%	14	93.3%
	Company Website	9	60.0%	9	60.0%
	Intranet	12	80.0%	11	73.3%
	ISDN/ADSL,etc.	14	93.3%	11	73.3%

Figure 9. Platform Usage in Suppliers



With regard to the IT personnel support, there are 20% of the suppliers outsource their computer maintenance and information system to outside professionals (Table 9) to eliminate the headcount, labor, and pension issue in the future.

Table 9. IT Personnel Support

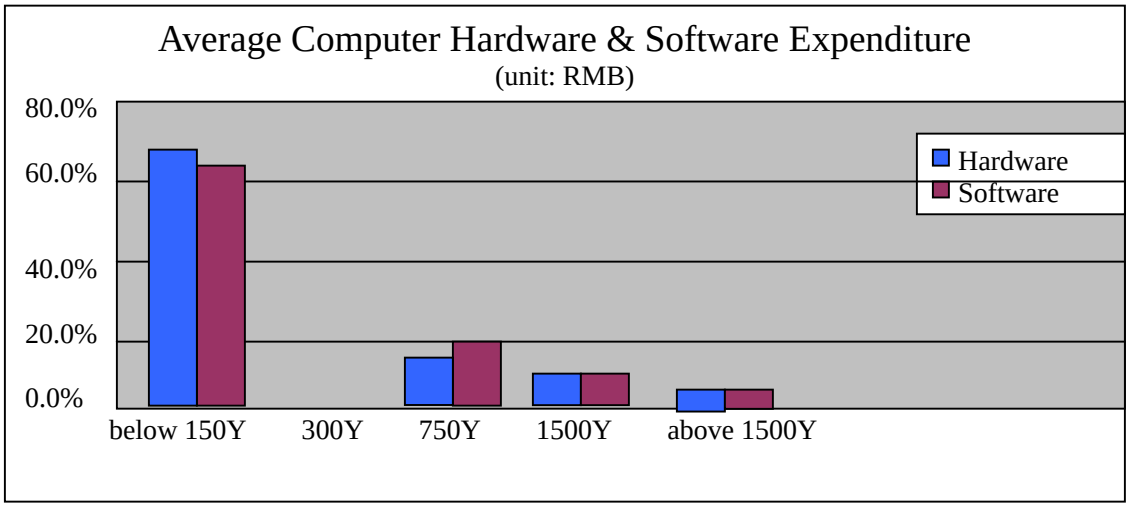
(unit:persons)	1st tier	%	2nd tier	%	Total	%
0	4	26.7	2	13.3	6	20.0
1-3	7	46.7	11	73.3	18	60.0
4-9	3	20.0	1	6.7	4	13.3
Above 10	1	6.7	1	6.7	2	6.7
Total Suppliers	15	100.0	15	100.0	30	100.0

Question 2 asked about the expenditures on computer hardware and software. Annual average spending on both of the computer hardware or software is less than RMB115,000 per year (Figure 10). The hardware and software budget for the following year does not increase much according to table 10, but there are several suppliers mentioned about their plan to adopt SCM and had increase the hardware or software budgets. The surveyed suppliers' investment in computer related facilities are relatively low (Table 10) if compare to the average annual investment of RMB0.12 to 0.24 million of each enterprise (The R.O.C. Information Industry Yearbook, 1997).

Table 10. Expenditures on Computer Hardware & Software

	Hardware				Software			
	1st tier		2nd tier		1st tier		2nd tier	
(unit:RMB)	Average	Next year	Average	Next year	Average	Next year	Average	Next year
Below 150Y	10	8	10	11	9	8	10	12
150-300Y	3	4	2	1	4	4	2	2
300-750Y	0	1	3	3	0	1	3	1
750-1500Y	2	2	0	0	2	2	0	0
Above 1500Y	0	0	0	0	0	0	0	0

Figure 10. Average Computer Expenditures on Hardware and Software



Question 4 and 5 asked about how the orders are placed to suppliers and received from buyers.

93.75% of the suppliers are using e-mails or Internet to place orders or receive orders (Table 11). Based on weighted average approach, the most frequent order placing is by Fax, followed with emails (Figure 11 & 12). The 1st tier's usage of e-mail in receiving orders is higher than 2nd tiers, which is caused from the e-mails orders from focal companies. There are not many 2nd tier suppliers (about 30%) utilizing Internet to place or receive orders.

Table 11. Ranking of supplier's order placing and receiving

Frequency	1st Tier				2nd Tier			
	Phone	Fax	E-mail	Internet	Phone	Fax	E-mail	Internet
Order Placing:								
#1	0	14	1	0	2	12	1	0
#2	6	1	6	0	5	2	5	0
#3	4	0	3	0	2	0	4	3
#4	0	0	0	5	0	0	0	1
N/A	5	0	5	10	6	1	5	11
Order Receiving:								
#1	0	10	5	0	0	11	4	0
#2	1	4	8	2	4	4	6	0
#3	4	1	2	2	6	0	2	3
#4	3	0	0	3	0	0	0	2
N/A	7	0	0	8	5	0	3	10

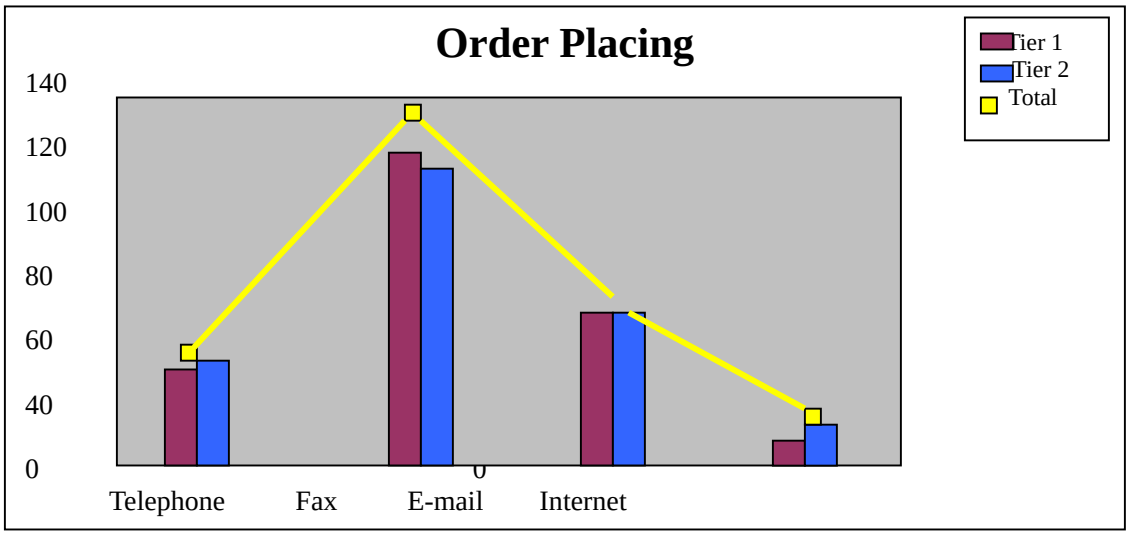


Figure 11. Order Placing Distribution

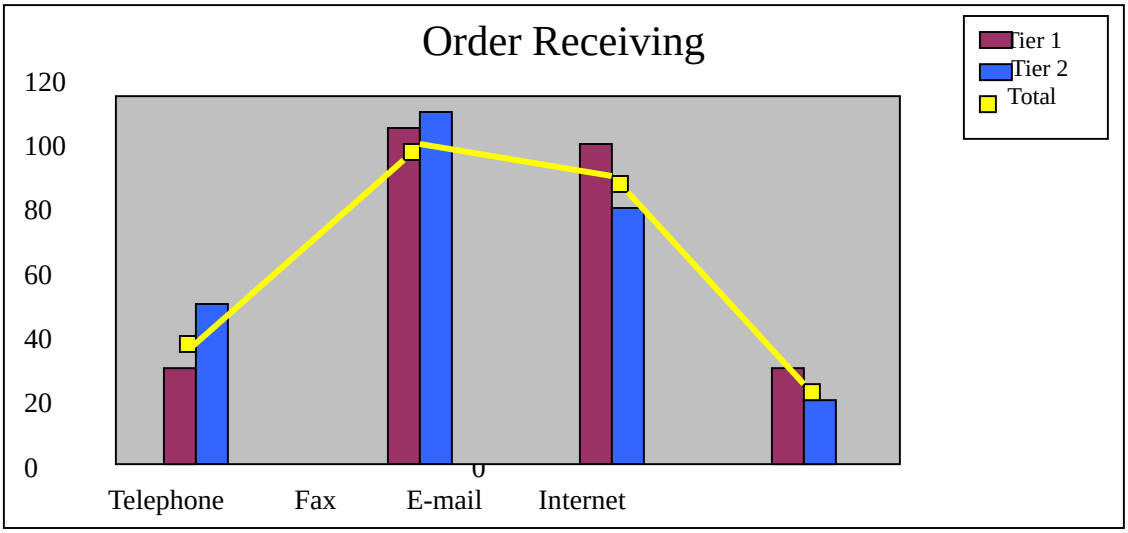


Figure 12. Order Receiving Distribution

Current operation performance:

Question 6.1-6.4 asked about the company's cycle time and inventory reduction by at least 50%; the company's production and transportation cost declined by at least 20%, the company's cost of quality declined by 50%; and the company on-time delivery at least 98%. (Please refer to Table 2 for details.)

60% of the suppliers answered at least "a little improved" for their current operation performance. Chi-Square test for equal frequency between the 1st and 2nd tiers suppliers for question Q6.1 through Q6.4 does not have significant difference (Table 12). The suppliers' current performance on inventory reduction and production/transportation costs are about the same. Only three suppliers' on-time delivery excels the goal of 98%. In the past three years, 73.7% of the suppliers' cost of quality has declined by 50% (Question 6.3). In contrast, 23.3% of the supplier's cost of quality has increased as a result of implementing quality assurance systems or employing new equipment (Table 13).

Table 12. Chi-Square Test for Equal Frequency between 1st and 2nd Tier for Question 6.1-6.4

	Q 6.1	**Q 6.2**	**Q 6.3**	**Q 6.4**
Chi-Square	0.85	1.68	0.63	0.59
DF	1	1	1	1
P-Value	0.36	0.20	0.42	0.44

Table 13. Frequency Distribution (6.1-6.4)

	Excelled the goal	Achieved the goal	A little improved	Remained the same	Not improved, but worse	Missing data	Average
Question 6.1	0	5	21	2	2	0	2.97
Question 6.2	0	7	17	2	4	0	2.90
Question 6.3	0	8	14	2	5	1	2.77
Question 6.4	3	8	13	6	0	0	3.27

Question 7 asked about the intention and supplier's current SCM implementation status without considering company XYZ's situation to choose from a 1 to 7 scale, as stated in Table 14, Stage 1 to Stage 7.

10% of the suppliers have implemented SCM in 2001, and all of them are from 2nd tier suppliers (Table 14). These three suppliers collaborate with international buyers and implemented the SCM to secure the orders and be competitive in the marketplace. 76.6% of the suppliers' SCM stages are in the understanding and surveying (stage 2), and most likely (stage 3) to adopt the SCM (Figure 13). It appears that the suppliers are starting to feel the need of implementing SCM. However, it also seems that adopting the SCM is not an urgent issue, and they have not yet received enough pressure from the focal company. The top managements among the surveyed suppliers

foresee the need of adopting SCM, but not immediately. On the other hand, the orders received from company XYZ are less than 20% for 53.3% of the 1st tier supplier and 70% of the 2nd tier supplier (Table 6).

Table 14. Current Supply Chain Implementation Status for Surveyed Companies.

Stage	Description	1st tier	2nd tier	%
1	Not interested	0	1	3.3
2	Surveying	7	4	36.7
3	Willing to implement	6	5	36.7
4	Planning to implement	0	1	3.3
5	Implementing	2	1	10.0
6	Just implemented	0	2	6.7
7	Implemented for a while	0	1	3.3

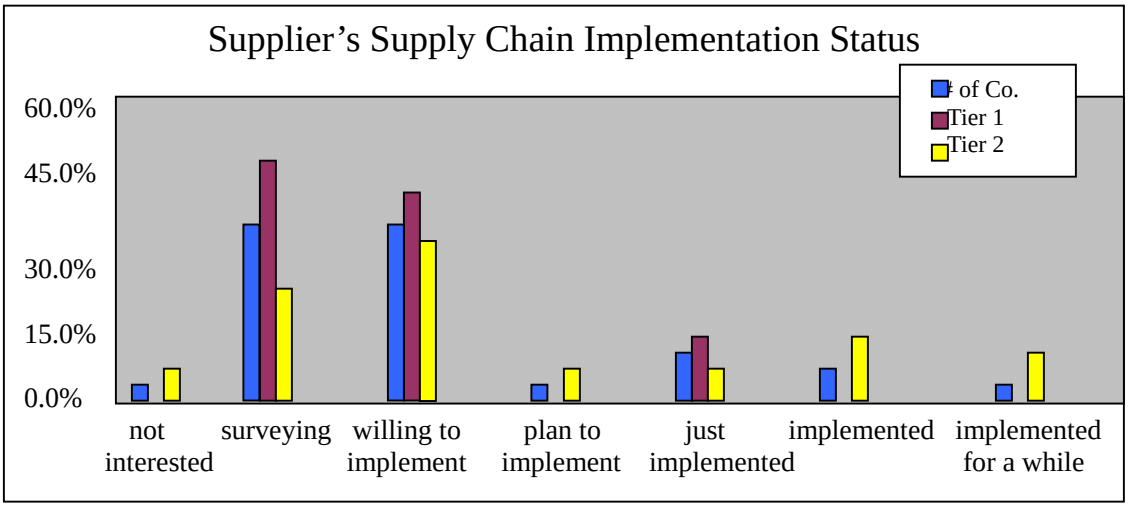


Figure 13. Supplier's Supply Chain Implementation Status

Prior implementing experience:

Question 8.1-8.10 asked about the respondents' viewpoints regarding their companies' experience in implementing a new system or a policy. (Please refer to Table 2 for details.)

In this section, most of the questions are regarded as important ($P<0.001$). Based on weighted approach, the most agreed fact chosen when implementing a new system or a policy was that the company provides proper training to job related employees (Question 8.4), followed with adopting a "pilot team" (Question 8.2), top management's commitment (Question 8.3), keeping a close and trust relationship with system providers (Question 8.6), and successfully implemented the system (Question 8.10) according to the frequency in Table 15. The value of employees' skills and knowledge results in effective processing and management's empowerment and commitment lead the project to succeed.

Table 15. Frequency Distribution (8.1-8.10)

	Very agree	Agree	No comment	Disagree	Very disagree	Missing data	Average
Question 8.1	6	17	4	3	0	0	3.87
Question	7	18	6	0	0	0	4.00

8.2							
Question 8.3	7	19	1	3	0	0	4.00
Question 8.4	9	20	0	1	0	0	4.23
Question 8.5	6	14	9	1	0	0	3.83
Question 8.6	10	15	5	0	0	1	4.00
Question 8.7	6	13	4	6	1	0	3.57
Question 8.8	2	13	12	2	0	1	3.40
Question 8.9	5	21	3	2	0	0	3.93
Question 8.10	4	23	2	1	0	0	4.00

Question 9.1-9.4 asked about the respondent's understanding of supply chain management, such as the idea of SCM, the company's attitude toward SCM and E-commerce as well as the competitor's SCM status. (Please refer to Table 2 for details.)

Most of the respondents agree that the supply chain is an extension of material management, logistic management, etc. (Question 9.1), but disagree that the SCM has relatively little impact on strategic business, company operation, or marketing planning (Question 9.2). 33.3% of the respondents do not know if their competitors have implemented SCM or E-commerce (Question 9.4), (Table 16). The respondents have very basic understanding of SCM and some of them do not have the knowledge of their competitors' SCM status. In order to develop a successful SCM plan, companies should take the competitor's situation into consideration and to gain understanding of entire SCM.

Table 16. Frequency Distribution (9.1-9.4)

	Very agree	Agree	No comment	Disagree	Very disagree	Average
Question 9.1	4	17	5	4	0	3.70
Question 9.2	0	5	4	16	5	2.30
Question 9.3	7	17	6	0	0	4.03
Question 9.4	5	15	9	1	0	3.80

Section III, impact factors:

In Section III, questions regarding the respondent's experience or knowledge of any success or failure SCM implementing cases (Q C01), and if such experience will influence their intention of adopting SCM (Q C02) were

asked.

53% of the respondents have never learned or heard about any successful or failure SCM implementation cases (Figure 14). Although overall answers on C02 is significant, for those who chose “yes” in C01 indicates that such experience will not affect their intention (P>0.05) of implementing SCM in the future (Table 17). From conversation with the respondents, a majority number of the top managements have basic understanding of the supply chain, and are interested in implementing the supply chain, even though some of them are suspicious about how the SCM shares information.

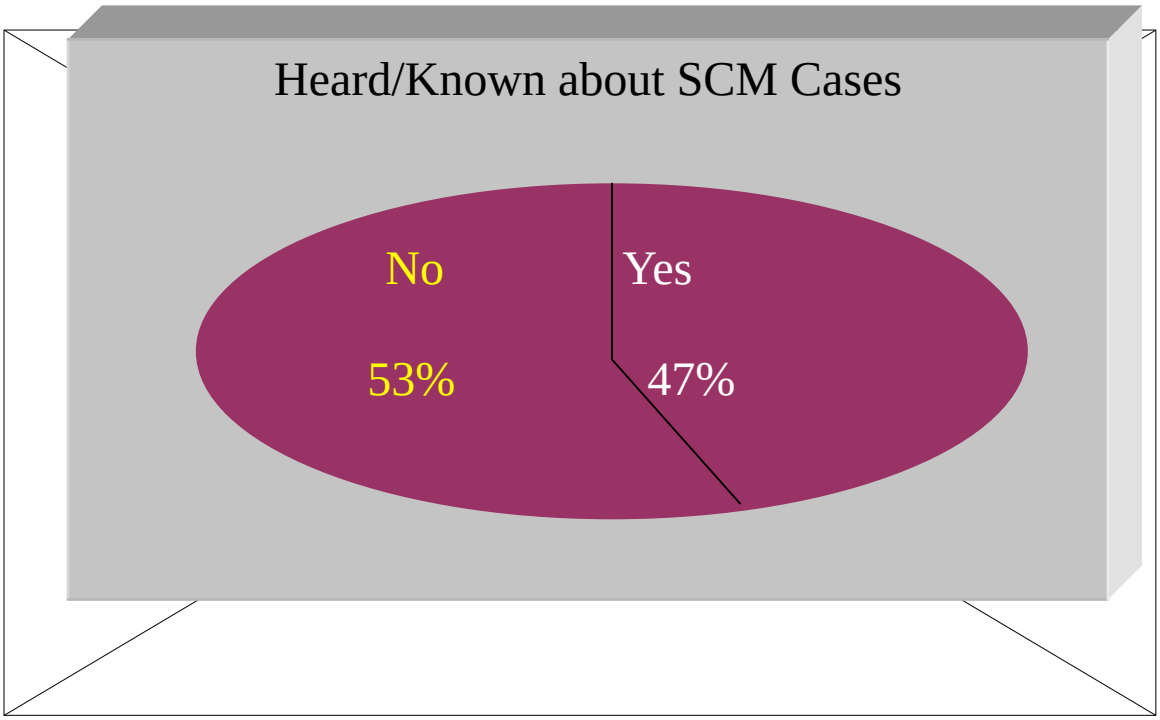


Figure 14. Have the Respondents Ever Heard or Known about any Successful or

Failure SCM Implementing Cases?

Table 17. Contingency Table for C01*C02

		C02			
		Yes	No	Total	P-Value
C01	Yes	8	6	14	0.593
	No	2	14	16	
Total		10	20	30	

In section III, questions are divided into six dimensions, leadership, organizational values, company strategies, human resources, assessments and others. (Please refer to Table 2 for question details.) In general, there is no significant difference between tier 1 and tier 2 answering questions from A.1-F.2 at level of @=0.05. The overall questions are considered as important to very important (P<0.001). Ranking of each section were designed in order to determine the most important and least important factors. The reliability of this section is existed because the answers in Likert Scale matching the answers in ranking.

A. Leadership:

In questions A.1-A4, regarding leadership questions are asked, such as top management's understanding, supporting and involving of the project,

providing clear directions, and assigning adequate resources. (Please refer to Table 2 for details.) Table 18 listed the frequency distribution by Likert Scale. Among these questions, the Chi-Square test at type I error level equals to 0.05 is significant in ranking from question A.1 to A4. Therefore, the most important factor we concluded is the top managements' full understanding and supporting (Question A1) when implementing SCM and the top managements' involvement in each step is the least important factor. This finding makes sense, however, both factors are important to the success of implementing SCM and top management's involvement in each step should not be omitted.

Table 18. Frequency Distribution (A.1-A.4)

	Very important	Important	Not related	Not very important	Very unimportant	Average	Ranking the most important	Ranking the least important
Question A.1	22	8	0	0	0	4.73	19	2
Question A.2	11	17	1	1	0	4.27	1	19
Question A.3	18	12	0	0	0	4.60	7	3
Question A.4	19	11	0	0	0	4.63	3	6

B. Organizational values:

Questions B.1-B.6 ask about the company's organizational values, such as flexibility of strategic processes, re-organization capability, innovation, and departmental communication and knowledge sharing. (Please refer to Table 2 for details.) Most of the respondents believe all the factors are either very important or important (Table 19). Questions B.1-B.6, the Chi-Square test at @=0.05 is not significant in ranking. However, the ranking distribution shows that "Company inherits experience and knowledge sharing" (Question B.6) is deemed to be the least important. When the entire organization worked closely together and share the knowledge could provide a powerful source of internal support that could significantly assist marketing and sales in winning market share (Ross, 1998). Knowledge management and sharing should be organized and exercised in each company to build up a successful SCM scheme even it is deemed to be the least important factor among those 6 important factors.

Table 19. Frequency Distribution (B.1-B.6)

	Very important	Important	Not related	Not very important	Very unimportant	Average	Ranking the most important	Ranking the least important

Question B.1	15	12	3	0	0	4.40	10	2
Question B.2	13	17	0	0	0	4.43	4	2
Question B.3	11	19	0	0	0	4.37	6	0
Question B.4	12	16	2	0	0	4.33	5	9
Question B.5	16	14	0	0	0	4.53	3	5
Question B.6	13	15	2	0	0	4.37	2	12

C. Company strategies:

In questions C.1-C.5, questions regarding company strategies are asked, such as building a trust and information sharing supply chain, improving competitiveness and providing employees time table. (Please refer to Table 2 for details.) Table 20 listed the frequency distribution by Likert Scale. Among these questions, the Chi-Square test ($P>0.05$) is not significant in ranking. Based on the weighted average and frequency distribution on both Likert Scale and ranking, implementing the SCM in order to secure the order (Question C.5) is considered the least important in this section. Based on most of the respondent interviewed, they see the SCM implementation is more like a strategic plan and market trend rather than just to secure the

orders from focal companies.

Table 20. Frequency Distribution (C.1-C.5)

	Very important	Important	Not related	Not very important	Very unimportant	Average	Ranking the most important	Ranking the least important
Question C.1	18	11	1	0	0	4.57	11	0
Question C.2	16	13	1	0	0	4.50	8	3
Question C.3	11	18	1	0	0	4.33	5	6
Question C.4	14	15	1	0	0	4.43	2	3
Question C.5	10	19	1	0	0	4.30	4	18

D. Human resource functions:

Question D.1-D.6, ask about the company's human resource functions, such as employee's resistance on adopting new system, providing proper training

programs, IT personnel's supports, and outsourcing consultants. Table 21 listed the frequency distribution by Likert Scale. The Chi-Square test at @=0.05 is not significant. However, the ranking distribution shows that having skillful IT personnel or good outside consultants is relatively not as important. Comparing to the Report of MOEA (2000), see Figure 2, the shortage of IT professionals is the biggest barrier for the manufactures to implement electronic related technologies. The respondents see the important factors of adopting SCM is not just limited to IT support, but also providing training and communicating with employees.

Table 21. Frequency Distribution (D.1-D.6)

	Very important	Important	Not related	Not very important	Very unimportant	Average	Ranking the most important	Ranking the least important
Question D1	15	15	0	0	0	4.50	9	1
Question D2	14	16	0	0	0	4.47	7	2
Question D3	17	12	1	0	0	4.53	12	2
Question D4	14	16	9	0	0	4.47	1	0
Question D5	7	19	4	0	0	4.10	0	9

Question D6	4	23	3	0	0	4.03	1	16

E. Assessments:

Questions E.1-E.2 ask about assessing the performance of SCM implementation. (Please refer to Table 2 for details.) To set up and check on the short-term goals is believed to be more important than whether the company is continuously in the process of assessing the pros and cons of their SCM project (Table 22). As SCM is a continuously evolving management philosophy that seeks to unify the collective productive competencies and resources of the business functions found within the enterprise and outside partners (Ross, 1998), the continuously assessing the SCM should not be omitted when implementing SCM.

Table 22. Frequency Distribution (E.1-E.2)

	Very important	Important	Not related	Not very important	Very unimportant	Average	Ranking the most important	Ranking the least important
Question E.1	12	14	0	0	1	3.90	19	11
Question E.2	14	13	1	1	1	4.27	11	19

F. Others:

Question F.1-F.2, two questions are asked in this section. One is in regard to the new and old systems' compatibility (Question F.1) and the other concerns the importance of the financial support (Question F.2) to SCM. 90% of the respondents see the financial support is an important issue for implementing SCM. Though the financial support is important, a few of the respondent also believe that SCM is not simply a capital investment, but also involve continuously unfolding of dynamic organizational, marketplace, and product strategies. To successfully implement SCM, no single factors should be ignored.

Table 23. Frequency Distribution (F.1-F.2)

	Very important	Important	Not related	Not very important	Very Unimportant	Average
Question F1	12	13	4	1	0	4.20
Question F2	12	15	3	0	0	4.30

5. Conclusion

In general, most of the respondents have had successful experiences with the new system or policy implementation. Most also agree with the importance of integrating the supply chain management and are interested in adopting the SCM to improve their competitiveness and to become internationalized. A questionnaire approach has been done in this study, and therefore the respondents' subjective opinion can be anticipated. Most of the respondents

evaluated the impact factors important to the success or failure of SCM implementation. The following conclusions have been drawn with regard to this study.

5.1 Importance of impact factors when adopting SCM

Base on the total responses, all the factors addressed in the following six dimensions are important: leadership, organizational values, company strategies, human resources, assessments, and others. Ranking among the factors in each dimension highlights the most important and least important factors' impacts on the success or failure of adopting SCM. The most important factors are easily recognized, but the "least important" factors are possibly ignored, even though they are still important. The following suggestions should help the companies in the planning or implementing stages to avoid neglecting any of these important factors.

A, Leadership: Many SCM implementations fail, not because of the organizational and technical requirements but because of a distinct lack of management commitment (Ross, 1998). It is essential that top mangers are fully understanding and supportive (Table 18, Q A.1) when adopting SCM. This study has found that some of the top mangers learned about the "supply chain" from their business communications, such company XYZ's announcement of changing the order format due to implementing the SCM system and suspending shipment for few weeks, etc. Such information usually does not provide in-depth viewpoint of SCM and could even mislead the supplier. In order to stay competitive, the company managers need to rethink their traditional business structures, to evaluate the impact of

challenges from today's dynamic market, and then to determine the need for implementing SCM. The leaders play important roles in the success of adopting SCM, including such things as gaining more knowledge and information on the supply chain to fully support and to provide clear directions to SCM implementation.

Top management (all the way up to the CEO) must endorse the initiative and provide the resources necessary for success of implementing SCM (Fawcett and Magan, 2001). Top managements who are directly involved with the project and actively engaged with the team in each process are ranked as the least important factor (Table 18, Q A.2). Management's carelessness in interaction with the team or their reluctance in getting involved with the project could jeopardize the SCM adoption. Requirements for consistent and directed leadership on the part of management is even more crucial when it is considered that all the management groups participating in a SCM initiative must all be fully committed (Ross, 1998).

B, Organizational values: In the dimension, respondents ranked the company inherit experience and knowledge-sharing to be the least important factor. Transferring the personal experience of participants into organizational learning is a challenging task. But understanding and knowledge of all value-added activities in the supply chain are critical to coordinated modeling. Restructuring of these activities can provide excellent opportunities for improvement (Thomas and Griffin, 1996). Therefore, capturing the know-how of team members and sharing their experience in order to establish institutional knowledge should not be overlooked.

Knowledge management has been explored recently, but most of the suppliers have not yet focused on sharing the resources and information, this is true also of the company XYZ. The sharing of expertise among employees or channel members is an important facilitator that helps the supply chain team become more competitive. Therefore, this factor should be a focus of any company to implement SCM successfully.

C, Company strategies: Developing SCM strategies include such concerns as how a company could optimize the existing marketplace, or how it can benefit from sufficient resources in supply chain. 96.7% of the respondents believe that gaining the support and building trust among supply chain partners are very important (Table 20.C.1). However, garnering supplier support for SCM activities can be difficult given the long history of adversarial and asymmetric dealings that have often governed buyer/supplier relationships. These relationships have been characterized by dominant buyers who have used their leverage to squeeze suppliers' profit margins (Fawcett and Magnan, 2001). Several of the suppliers suspect the SCM is simply one more request from company XYZ to ask their supplier to invest capital in system with no appropriate profit returns. Several of the top managers interviewed from the 1st tier suppliers remain suspicious of how the SCM information can be openly shared to achieve mutually beneficial results, even though 96.7% of respondents (Table 20, Q C.4) also say they believe that company information-sharing after implementing SCM is important.

The other problem in sharing information with the initial tier or big overseas

supplier remains unsolved. An example is given of the 2nd tier supplier who implemented the SCM, resulting in a piled-up inventory. When the focal company pushed down the product cycle time from 4 weeks to 2 weeks in footwear division, this supplier needed to absorb its inventory cost to meet the 1st tier company's and the focal company's requirements while dealing the fact that the raw material shipped from overseas takes one month to arrive by vessel. If this focal company had been able to extend the forecast information sharing to the initial upstream supplier, the transportation lead-time could have been taken into account. But as a consequence of company XYZ's lack of understanding, this focal company's first launch of SCM in footwear division was not successful.

In the report of MOEA (2000) (See Figure 2), "lack of cooperation between up and down stream suppliers" is the second difficulty in implementing electronic related technologies. Building up a foundation of effective supply chain organizational relationships is one of the critical factors to managing the supply chain successfully. To break down the barrier between supplier chain partners, the focal company needs to commit to using a single or dual source of supply over an extended period of time. In the case we studied, the sports and fitness industry is traditional with a low entry threshold. Cost has been the major concern of the focal company when sourcing a supply partner. The strategic sourcing of company XYZ is indexed by gross margin of each product. The suppliers from Vietnam, Indonesia and Thailand can usually offer competitive prices. The company in China should not only compete with the cost, but also needs to reevaluate the activities with which their organization can add value to the supply chain. Therefore,

implementing supply chain to secure the orders (Q C.5) can be done.

D, Human resources: From the implementing experiences the suppliers had 90% of them were able to implement a new system or a policy successfully (Table 15). Beside the top management's commitment and participation, it is essential to provide proper training to employees who will be supporting and implementing the SCM every respondent deems that proper training must be provided for the lower level managers and workers (Table 21, Q D.4). Competent employees do not remain competent forever. Skills deteriorate and can become obsolete (Robbins, 1998). In the case we studied, the focal company XYZ usually provides training programs to the 1st and/or 2nd tier suppliers whenever there is a change in policy or operation in order to streamline the process. Based on the interviews with the surveyed suppliers, very few SCM training opportunities are provided to their employees. This can cause confusion and a breakdown in the implementation process, therefore the training is important when adopting and implementing SCM.

Every respondent also considers that communication with employees to minimize any resistance to changes is another important element of the implementing process (Table 21, Q D.2). One of the most well-documented findings from studies of individual and organizational behavior is that both organizations and their members resist change. Properly managing the resistance can stimulate a healthy debate over the merits of the idea and result in a better decision (Robbins, 1998).

It appears that a company's having IT persons with good ability and skills is not as important as other factors. Smaller firms were reluctant to engage the services of in-house IT managers in the manner larger firms had done (Fink, 1998). The unique characteristics of SMEs with respect to IT have caused them to rely more extensively than larger organizations on outside help. However, research to date indicates several factors that encourage small business adoption of IT (Fink, 1998). For SCM initiatives to have significant impact now and in the future, information systems people must take on an increasing high-profile, high-energy support role (Fawcett and Magnan, 2001). The suppliers should not ignore the IT personals' high abilities and valuable skills to create greater operational efficiency and management effectiveness in SCM.

E, Assessment: Most of the respondents see that setting up and check on shot-range goals is more important than constantly assessing the SCM strategies. Being able to measure the benefits of an SCM implementation is absolutely critical to its ongoing success (Ross, 1998). So, both of the short-range and constant measurements are important to the success of adopting SCM.

F, Others: the new system's compatibility with the old system is an important factor according to most respondents' opinions. Very few suppliers integrate their EDI into their financial and purchasing databases (Hira,

2000). These suppliers gain nothing from the focal company's push towards automating procurement except to make that focal company happy if not integrate the entire system.

Sufficient financial support to SCM is considered an important factor as well. SMEs are regarded "poor" in human, financial and material resources (Fink, 1998). Most of the respondents believe that implementing the SCM takes company's financial support to succeed.

5.2 Opportunities for SMEs

With regard to the supplier's current operation performances, there is no significant difference between 1st tier and 2nd tier suppliers (P>0,05). A few of the 1st tier suppliers have been loosing some business to the suppliers in Southeast Asia due to higher material costs in China. The change of business competition is beyond the traditional conception of the marketplace. SCM strategies are concerned with the creation of new visions of logistic that transcend conventional techniques of purchasing, producing, storing, and selling products and services, their real importance resides in their ability to assist executives in designing a clear blueprint for the development of new organizational architectures that will prepare their companies to build uncontested marketplace advantage in the future (Ross, 1998).

The surveyed suppliers' SCM implemented situation versus current

operation performance is shown in Figure 15. Each of the company could be plotted on a 2 x 2 matrix to identify which ones need to implement SCM immediately and which ones do not have an immediate need. The horizontal axis represents 7 stages (1-not interested, 2-surveying, 3-willing, to implement, 4-plan to implement, 5-just implemented, 6-implemented and 7-implemented for a while) of the companys' SCM implementing status (Question 7), and the vertical axis indicates their current operation performance (1-not improved, but worse, 2-remained the same, 3-a little improved, 4-acieved the goal and 5-excelled the goal).

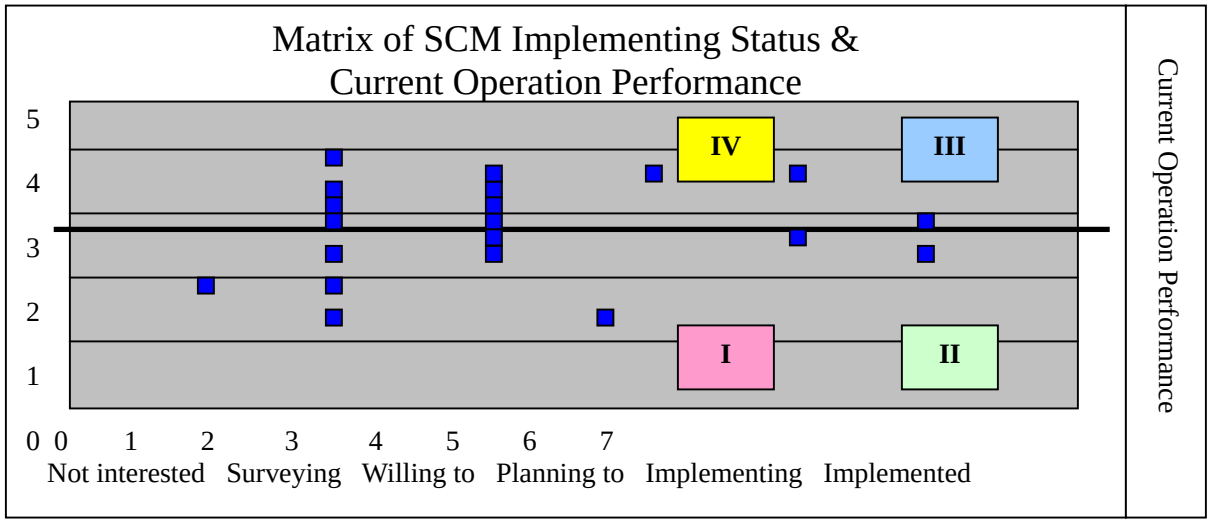


Figure 15. Matrix of SCM Implementing Status & Current Operation Performance

For definitional purposes, a high SCM implementation stage means that the company has implemented SCM for a while and a high operation performance is defined at least in level 3 from question 6.1 to 6.4. The matrix defines four regions as follows:

I. Deferrer (low SCM implementation stage, low operation performance level)

II. Under achiever (high SCM implementation stage, low operation performance level)

III. Market leader (high SCM implementation stage, high operation performance level)

IV. Follower (low SCM implementation stage, high operation performance level)

Several of the surveyed suppliers fall into region I and are classed as Deferrers. Most of these suppliers are in the SCM surveying stage, but one supplier is not interested in SCM. Most of these suppliers share the same characteristic of being either small scale or family owned. They are also not as competitive as other bigger-sized suppliers and usually conservative in making changes. If Deferrers resist change, trouble begins when innovative competitors/Market Leaders challenge the existing paradigm.

Only one supplier falls into region II, as Under Achiever with SCM just implemented, but a low level of operation performance.

Two suppliers fall into region III, as Market Leaders. According to author's working experience, both suppliers provide efficient development service and remarkable product quality. Market Leaders usually maintain their market share through continuously improving their competitiveness in the

dynamic environment.

Most of the suppliers fall into region IV, as Followers. In fact, most of the 1st tier suppliers fall into this region. They remain competitive by providing timely delivery, shortened product cycle times and quality products. Followers have a high potential to adopt SCM and also have a tendency to accept and adjust to new challenges. The opportunity for these companies is entering into the E-marketplace, which will be elaborate in a later section.

5.3 Suggestions for SMEs

Because of the fact that many SMEs lack resources, the SCM initiatives have not yet been popular. As a result of this study, it is found that most of the suppliers are either Followers or Deferrers, even though they are interested in rolling into the SCM and able to identify the important factors which impact the success of SCM adoption. The global supply chain trend is moving gradually form Web Presence, Intranet Publishing, Online Store Front and Enterprise Extranet to Intranet Procurement and Electronic Supply Chain, to eventually achieve Dynamic Trading (Lee, 2000). Most of the surveyed suppliers are in the Web Presence and Intranet Publishing stage and are interested in transforming to the next stage of Online Store Front to stay competitive. The following suggestions are opportunities for SMEs to keep competitive in the changing marketplace.

A. E-Marketplace

The sports and fitness equipment industry is known as a traditional industry. With the help of Internet technology, the online marketplace can provide the SMEs opportunities to compete in the global market. The framework of the collaborative online marketplace is based upon integrating suppliers, suppliers' suppliers, customers, and customers' customers. The flexibility of this framework is either to provide a public online marketplace or links to other worldwide online marketplaces. Through the framework of collaboration, the supply chain members can start with demand forecasting and production planning. By sharing information all the way from the point of sale to the inventory levels of the suppliers' suppliers, all participants in this system can gain a competitive advantage, can optimize performance, and can make a profit.

An e-marketplace can allow traditional, tightly linked systems to share information across channels and to overcome the natural barriers to information sharing. This world provide new opportunities for sharing information across multiple, external supply chain partners. Also, the enterprise information portal for employee or important clients and the enterprise service portal for buyers or suppliers can be accessed through any standard protocols.

B. EDI (Electronic Data Interchange) and XML (Extensible Markup Language) solution

Today, the businesses can communicate almost instantly around the world,

transmitting through cellular telephones that permit easy access at any time. The Electronic Data Interchange (EDI) is designed to eliminate redundancies in data entry and to facilitate the speed and accuracy of the information flow across supply channels by linking applications between companies. Possible benefits of implementing EDI include reductions in office staff and supply costs, telephone and facsimile costs, data entry time and costs, accounts receivable days outstanding, customer service errors, and on-hand inventories. Besides cost savings, EDI enables companies to improve customer responsiveness, tighten channel relationships, and compete better globally by shrinking product time to market and shrinking delays associated with international documentation.

However, due to the tremendous cost and complexity of the EDI system, most of the EDI users are Fortune 500 firms in the U.S. Not only is there the disadvantage of the cost and time consumption, but also database upgrading is another issue for using EDI. In the case we studied, most of suppliers have implemented the intra-enterprise information system. The inter-enterprise integration costs are greater and it is much more difficult to implement. A cost effective and well functioning electronic commerce platform can be accomplished by utilizing XML. There are many different EDI standards, such as ANSIX12, UN/EDIFACT, and ODETTE, which make the transformation of data both complex and time consuming. XML is a simplified subset of the Standard Generalized Markup Language, which provides a file format for representing data, a schema for describing data structure, and a mechanism for extending and annotating HTML with semantic information (www.xmledi-group.org).

The big companies, which have already spent money to implement EDI, will not want to discard the standards which have been set up, but the transforming of each new transaction is costly and time-consuming. XML provides a standard framework to exchange different types of data with a cheaper cost and speedy processing. XML is also able to transform the ANSI X12 and EDIFACT. Therefore, the small-and medium sized business entities can take advantage of the popularity of XML. The XML/EDI provides the solution for SMEs since the cost is much cheaper and data exchange is direct.

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