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From:

## **Asian Cases on Supply Chain Management for SMEs**

©APO 2002, ISBN: 92-833-2319-X

### **Report of the Symposium on Supply Chain Management for Small and Medium Enterprises**

*Taipei, Republic of China, 11–14 December 2001  
(SYP-SY4-01)*



**Published by the Asian Productivity Organization**

1-2-10 Hirakawacho, Chiyoda-ku, Tokyo 102-0093, Japan

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**ASIAN CASES ON  
SUPPLY CHAIN MANAGEMENT  
FOR SME**

**2002  
ASIAN PRODUCTIVITY ORGANIZATION  
TOKYO**

Report of the Symposium on Supply Chain Management for Small and Medium Enterprises held in Taipei, Republic of China from 11 to 14 December 2001 (SYP-SY4-01)

This report has been edited by Dr. Mark Goh.

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ISBN: 92-833-2319-X

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# INTEGRATED SUMMARY

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## BACKGROUND

The basis of global competition has changed. No longer are companies competing against other companies, but rather supply chains are competing against supply chains. The success of a business is now invariably measured neither by the sophistication of its products nor by the size of its market share. It is instead usually seen in the light of the ability to harness its supply chain, sometimes forcefully and deliberately, to deliver responsively to customers as and when they demand it.

More often than not, this necessity is brought about by the onset of new and emerging, albeit sometimes disruptive, technologies. The rapid penetration of these new technologies such as the Internet is also transforming global commerce, shrinking the marketplace, forcing situations of highly unstable and unpredictable demand intensities, and shortening the lead times of critical information flow. In this setting, the literature, both trade and academic, has repeatedly reported how technology as a driver of change has influenced the supply chain practices of many multinational corporations (MNCs).

For those MNCs, their supply chains are intricately linked to the digital economy on a path of no return. Therefore supply chain management (SCM) will have to be linked to the new digital economy as demanding and technology-savvy customers around the world increasingly expect goods and materials to be delivered to their doorstep at “click-speed,” courtesy of broadband capabilities. Charles Fine (1999), in his book *Clockspeed: Winning Industry Control in the Age of Temporary Advantage*, emphasized that the ability to capture and share Internet-enabled, real-time information has dramatically boosted the clockspeed of many industries, dictating the key elements of survival. Countries and firms alike that desire to participate in global supply chains must understand and embrace without further hesitation the new mantra of SCM on which the new competition is premised. Likewise, Asian enterprises must adopt these new technologies to participate effectively and navigate successfully in the new economy.

Against this background, the APO organized its first Symposium on Supply Chain Management in January 2001 in India to provide an exploratory platform for member countries to share their experiences in the practical applications of SCM which have contributed to increasing customer satisfaction, improved productivity, better work processes, and greater competitiveness. During that first symposium, one prime concern highlighted was the financial and organizational ability, and perhaps willingness, of indigenous SMEs to invest in much-needed IT infrastructure (which might not yield a corresponding rate of productive return) and other related technologies (like RFID, ADC, ASP, etc.) to improve their supply chain processes. Issues like complexity, time and space compression, and cooperating in e-marketplaces are all new challenges that SMEs must face and survive or risk being either marginalized to commodity players with a low value proposition at best or forced into oblivion in the worst-case scenario. In addition, SCM must integrate such SMEs to ensure greater collaboration between supply chain partners, in particular SMEs that serve as suppliers to larger corporations responsible for either

semi-finished or finished goods, and work toward a synchronized value collaboration network.

This Symposium on Supply Chain Management for SMEs is a timely follow-up program to highlight the pivotal role and importance of supply chains to SMEs and discuss ways in which SMEs can effectively and efficiently leverage SCM for greater productivity, greater competitiveness, and ultimately better customer satisfaction within their domain markets.

The methodology used is drawn primarily from:

- (i) case presentations by resource persons from Taiwan's leading SMEs (e.g., Inventec, Taskco Corporation, and Digi Chain Information Co. Ltd.);
- (ii) country papers presented by various APO participants (e.g., the Philippines' mango agribusiness industry, Indonesia's cement industry, Fiji's SMED Center, Sri Lanka's tea industry, South Korea's retail sector, India's Khadi and Village Commission, among others);
- (iii) lectures from resource persons related to SCM planning and process analysis, SCM technology, SCM trends and developments, and new paradigms in higher productivity strategies; and
- (iv) experiential learning through panel, syndicate, and informal discussions.

Twenty participants from 12 member countries contributed to the deliberations. Resource inputs were provided by Professor J. D. Kim, Kookmin University, Republic of Korea; Associate Professor Mark Goh, National University of Singapore Business School; Mr. Ryoichi Watanabe, Senior Consultant, SAP Japan; Dr. Huan-Tsae Huang, Chairman, Taskco E-Business Corp.; Dr. Chin-Wen Lin, Vice President, Inventec Corp.; and Dr. Li-Chih Wang, Chief Advisor, Digi Chain Information Co. Ltd. In all, there was fruitful deliberation on 24 diverse presentations. The resource persons, symposium participants, and the program and schedule are found in the appendices.

In addition, to facilitate the focus of discussion, the country papers were categorized under three broad sectors of public agencies, food related, and automotive and others to represent the main focus of country papers offered for presentation and discussion. Some guidelines for the syndicate discussions were also established.

## **SUMMARY OF ISSUES**

Based on the syndicate discussions and resource persons' presentations, the symposium arrived at several key conclusions.

### **Awareness of Good SCM Practices among SMEs Remains Low**

After the resource persons' presentation, participants realized that SCM is critical to their businesses and industries. However, based on the syndicate discussions and country paper presentations, most participants felt that their local SMEs still lack a strong awareness of good SCM practices such as maintaining ecological balance with the external environment, the Green Productivity concept, and product life cycle management. Understanding and implementing good practices in SCM should bring about dramatic changes in work and business processes, with positive results in efficiency, cost reduction, and better-quality services.

**SMEs Are Slow to Implement SCM**

Participants recognize that in today's climate of a single marketplace, intense competition, dynamic business environment, and proliferation of innovation and new disruptive technologies, organizations must implement SCM. However, for one reason or another, those SMEs that are aware of the need to install SCM systems have been slow to do so. Failure to act quickly and link productively to the SCM loop will impede the productivity levels of SMEs as globalization and competition (generated by the onset of the WTO regime) will continue to influence organizations and business systems nationally and regionally in APO member countries.

**SCM among SMEs Is Limited and Localized**

Because SMEs are small and highly fragmented, they are at a natural disadvantage when dealing with the overall management of the supply chain(s) that concerns them. Unlike MNCs, which have greater geographic reach and more abundant resources, SMEs generally do not have a clear view of the entire supply chain beyond their immediate operations and contacts. Therefore, these SMEs can only manage the supply chain within their close proximity. Also, by restricting themselves in this manner, they must be subservient to the larger players in the chain, wield little or no management control, and be subject to foreign exchange variations.

**Information Sharing Is Lacking among and between SME Vendors and Customers**

Best practice in SCM dictates the necessity to share and coordinate information on a global, real-time basis, with all players inextricably linked and plugged into the same information network. Unfortunately, SMEs plagued by survival and competitive fears put themselves in a quagmire when it comes to unrestricted sharing of data and information. Conversely, even if the SMEs want to share information among themselves and their supply chain partners, they need help to organize their databases effectively. For this reason, SMEs fragmented among themselves within the same industry simply cannot avail themselves of a good information infrastructure.

**SMEs Have a Low Level of IT Usage for SCM**

The standard technologies currently employed by MNCs to extract value from the supply chain are considered either too expensive or too sophisticated for the present level of business operations of SMEs. For example, the adoption of SAP is believed critical for smooth operations and transformation of data into information, but most SMEs cannot afford to invest in such a system, not to mention the requisite costs for maintenance and upgrading of the system. In the developing APO member countries, SMEs also suffer from being highly labor intensive, having less-educated employees, and consequently being weak in technology acceptance and adoption. This can deter SMEs from proactively embracing information and communications technologies.

**SMEs Want More Government Support for SCM Development**

The country paper presentations and the syndicate discussions clearly alluded to the need for more governmental assistance to help develop SCM systems to achieve higher productivity. The calls for help in establishing the basic SCM infrastructure required for the efficient movement and distribution of goods and services were especially poignant. However, it was recognized in the symposium that infrastructure development must go in tandem with skills and incentives. Governments and relevant public agencies must set clear policies in helping SMEs move with the SCM wave by facilitating the creation of

logistics facilities for the survival, sustenance, growth, and globalization of SMEs that can compete in the new millennium.

Therefore because SMEs are small and numerous and lack the requisite ingredients of finance, facilities, and skilled employees, they cannot harness SCM effectively to achieve greater productivity and customer satisfaction. As the rate of globalization and intense competition increases, so too will the need to re-jig supply chain processes to meet the changing requirements of the external environment. Until this is done, the seamless and boundaryless supply chain will continue to be out of the reach of SMEs. Thus external intervention must be introduced as quickly as possible to propel SMEs into the information age. Governments, NGOs, and self-help groups have a critical and immediate role to play in this regard. All three groups are instrumental and need to work together to build an environmentally friendly supply chain for SMEs, especially those engaged in the textile, automotive, and electronics subsectors.

## **RECOMMENDATIONS**

There are many ways in which the governments of APO member countries, industries and clusters in member countries, and the APO can expedite the adoption of SCM for SMEs that wish to achieve higher productivity. Some key recommendations are listed below.

### **Recommendations to the Public Sector**

The basis of competition has changed. Enterprises can no longer afford to compete in isolated pockets or in localized markets since the arena for competition has expanded. The relevant public agencies must therefore formulate appropriate, enticing policies to encourage SMEs to undertake productivity leaps through supply chain process or system improvement in their respective sectors, especially for smaller or micro enterprises. Also, government policies should be pro-SME and, where needed, be relaxed to facilitate greater and smoother trade flows for SMEs. In particular, more interest-free loans or subsidies should be earmarked specifically to encourage SMEs to adopt IT usage.

The governments of APO member countries should actively promote the awareness of SCM as a tool for sustaining economic growth and business excellence. This can be effected through sponsoring appropriate training schemes at the national or federal levels. Only then can the right sets of people and skills be established to provide the pool of technical expertise and management know-how necessary to conduct good SCM practices to achieve operational excellence. To do this, governments need to invest financially to raise the educational levels of people working in SMEs so that they can take advantage of the technologies and systems needed for good SCM practices.

National-level resource centers for SMEs should be established immediately, if not already in place, to serve as points of dissemination of SCM best practices, offer expert advisory services, and act as repositories of publications and related case studies on successful SCM implementation. Another role of the resource center is to serve as an information/knowledge clearinghouse for domestic industries with related industries elsewhere.

Governments of developing countries must engage external agencies or consultants to provide good SCM solutions or improvement services to help set the appropriate technology standards for the future. This can help to streamline the respective countries' SME sector with regard to SCM implementation. Other SCM-based standards and



infrastructure should be formalized by the relevant public agencies to facilitate SME logistics.

### **Recommendations to the Private Sector**

If the private sector recognizes the value of SCM as a tool for business excellence and a roadmap for growth in a competitive marketplace, industry and enterprises must be prepared to seek external advice and help from recognized experts. To do so, industries must learn to leverage the existing networks of industries around the region and draw upon their expertise and experience.

An association (formal or informal) or network for collaboration on SCM practices, innovation drives, and benchmarking of performance management in supply chains could be instituted at either the national or regional level among the various chambers of commerce or industry associations. Such self-help groups can provide the necessary bridges of knowledge on SCM, such as information sharing on current cost reduction best practices, good process redesign tools and techniques, and the adoption of technology enablers. In this way, the awareness level and implementation of SCM practices can be expedited. Furthermore, problems in SCM implementation can be reduced.

SMEs in the respective industries and local economies should form their own consortia to overcome the inherent weaknesses of small firm size, low value-adding human resources, and financial constraints, and to leverage the consortia to produce a stronger synergistic supply chain network. These consortia or cooperatives should then have better bargaining power when buying or selling in the larger business context. Economies of scale are needed for efficient supply chains. Such consortia can also make it more cost effective when information databases are set up by management consultants for SMEs.

Finally, SMEs need to work with their respective local governments to support the adoption of appropriate information and telecommunications technology in their industries and to support government-sponsored training programs where possible.

### **Recommendations to the APO**

Several recommendations for implementation by the APO were made at the symposium.

- 1) Organize a follow-up workshop/symposium on best practices in SCM to build on the momentum created at this meeting. The focus of those deliberations would be on presenting relevant, in-depth Asian case studies of SMEs that have demonstrated measurable success in SCM implementation. Through the presentation of such best practices, other member countries and their enterprises could benefit, and awareness could be created among indigenous SMEs that have yet to experience the full impact of SCM on their operations.

- 2) Create a link on the current APO Web site to disseminate updated SCM information, practices, adoption rates, and relevant resources. For example, useful information such as symposium papers related to SCM and best practices Web sites could be included in such a link. The APO could also use this link to showcase SMEs that have adopted best practices in SCM and provide an initial point of contact for other SMEs wishing to improve or implement SCM. In this way, the learning curve for the implementation of SCM could be expedited.

- 3) Arrange for a study mission on SCM in developed APO countries to illustrate to other member countries how the respective SMEs in targeted industries have physically and practically implemented SCM into their processes. The physical sharing, insight, and

interaction could serve to enlighten participants on the practical realities and results of SCM and operational excellence. This would also facilitate networking possibilities among such enterprises or industries. One particular focus could be the degree of technology usage in SCM.

4) Initiate more enterprise-level training and exchange programs on SCM among APO member countries. The APO, through the various NPOs, may think about engaging certified reputable trainers for short consultative-based courses on SCM implementation and innovation software or tools, especially targeting specific industry clusters such as agribusiness and automotives.

5) Related to the awareness of SCM and environmental friendliness, there appears to be a need to educate SMEs on preserving the ecological balance of the external environment. The APO could consider organizing another workshop/symposium to educate SMEs, particularly those from developing countries, on the strategic relationship among environmental friendliness, SCM, and good resource allocation management. Companies that have embraced and are actively practicing reverse logistics or Green Productivity should be strongly encouraged to act as models for case studies.

# EMERGING INFORMATION TECHNOLOGIES TO SUPPORT *e*-BUSINESS

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## IT FEVER, IS IT REALLY GONE? WHAT IS COMING NEXT?

In the new economy, Information Technology (IT), new business models, Supply Chain Management (SCM), the Internet, *e*-Business are all key buzzwords that formed the driving force of the prosperous American economy in recent years. After the passing or fading of such enthusiastic fervor, it is only natural for businesses and corporations to face the harsh reality. This is manifested in the sharply falling stock prices on the NASDAQ, the bankruptcy of ill-formed IT venture companies, virtually unprofitable new business models, soaring unemployment in the IT sector, huge stockpiles of inventories in the PC and semiconductor industries aggravating by shrinking demand. Nonetheless, before arriving at any conclusion, careful must taken to distinguish what are the real phantoms and bubbles, and what are the seeds of future growth. Hence, it is timely to review two examples of such IT rage and downturns.

*e*-Business was one of the favorite buzzwords during the years 1999 and 2000. Popular success stories on *e*-Business have included the likes of Amazon.com, Dell computer and Cisco systems. The most notable example is Amazon.com whose stock price soared to more than 100 US dollars in 1999, but now trades at around 7 US dollars. Even more interesting about Amazon.com is that this company has never been profitable since it was first established in 1995. The company had spent a lot of money collected from the stock market to build the IT and logistics infrastructure to support the business. When the stock price was at its peak in 2000, many people believed that retail stores will no longer exist in future. Instead, everybody will buy goods from the Internet. Today, casual observation shows that many retail bookshops have their own web sites to sell their web-centric products as well as through the retail shops. For this sector, to have both retail shops and web sites is considered as a competitive advantage since the customer can now physically go to the shop for service claiming. This strategy is now called the 'Click and Mortar' strategy.

While Amazon.com and other legendary *e*-commerce venture companies have been experiencing difficulties, consumers steadily increased their purchases from the Internet. Purchasing from Internet became an alternative to going to the retail shop to procure goods and services. Although some Internet shops disappeared after the recent downturn, there are still surviving click and mortar companies and these are yielding some profit. One example is the Japanese Internet mall called Rakuten that purchased the famous search engine company Infoseek recently. Rakuten provided a market portal on the Web so that many small companies can open their online shops with relatively small amounts of time and monetary investment. Today, the Rakuten mall has more than 20,000 retail shops and the number is still increasing. These small *e*-commerce companies which have very unique business models and good business strategies are surviving and are expected to grow even in the current IT recession.

A second example is about SCM. SCM was also one of the fashionable elixirs, which many large companies were looking for. Many software companies tried to sell

their SCM component, claiming that customers can save a lot of money by implementing their software. Indeed, there have been reports of customers that have successfully implemented SCM and as a result saved a lot of money. They have reduced either material inventory by strategically implementing Vendor Managed Inventory (VMI) or reduced finished goods inventory through obtaining more accurate demand forecasts. Nevertheless, bad news soon arrived at the SCM community in early 2001. It was in the form of the sneaker company Nike suing i2, one of the leading Supply Chain Planning (SCP) system developers. Nike had claimed that i2's demand forecast system provided the wrong information about the demand for sneakers. As a result, Nike suffered monetary losses by producing the wrong sneaker model, leading to a huge increase in the inventory of that model, while suffering from shortages of the other better demanded models. Lawsuits aside, apparently, Nike did not understand how to apply SCP properly in their business. SCP is not a magic box that will yield freely the sales forecast in any circumstance. Instead, the user has to enter all the needed information accurately. As usual, there are always assumptions and conditions required to obtain the desired forecast out of the system. The caveat of garbage in (wrong data) garbage out (wrong results) still holds. If anyone were to be blamed in this i2 incident, it had to be the i2 sales personnel who misled the customer's expectation during the selling of their SCP product. Nevertheless, there are many companies using SCP properly today and have as a result improved their business bottom lines. No doubt, the final customer's demand on such software is increasing as this is an important weapon for survival in the global competitive marketplace. On the other hand, the customer's spending on such software has decreased.

## **IT: DRIVING FORCE OF E-BUSINESS ESTABLISHMENT**

This section reviews the latest IT trends, which has accelerated the recent e-Business euphoria. Many new acronyms are already found in the IT world. For those who are unfamiliar with such terminologies, this section can also serve as a handy reference. As such, the following list of descriptions focuses on mainly user applications, which can be used to support the daily business processes in the field of e-Business.

### **ERP (Enterprise Resource Planning)**

ERP is a business software package, which covers all of the basic business procedures for a wide variety of industries. For instance, the business areas covered by ERP are found in financial accounting, management accounting, sales, inventory management, purchasing, production planning, human resource management, and so on. Some ERP vendors provide industry specific solutions, but most major ERP vendors (for example, SAP, ORACLE, PeopleSoft) claim that they provide cross-industry core modules as well as industry specific components, which can supplement the core modules. The industries currently covered by SAP, for example, are in aerospace and defense, automotive, banking, chemicals, consumer products, engineering & construction, financial services, healthcare, higher education & research, high tech, insurance, media, mill products, oil & gas, pharmaceuticals, public sector, retail, service providers, telecommunications, and transportation and utilities. The commonly used business practices in these industries are already built into the system as best practices and users can select them by simply setting the parameters with no program coding required for customizing. ERP sensitizes the information flow within a company on a real time basis. As such, the data across departments in a company is made visible. This then allows the

supply chain within a company to become very structured and efficient. ERP implementation was very popular in the U.S. in 1996 and 1997. Today, ERP implementation is expanding to Japanese companies, about 3 to 4 years after its peak in the U.S.

## **SCM**

While ERP focuses on the problems within a single plant or company, SCM provides a solution to the problems and inefficiencies between companies or plants. After many companies have implemented ERP to improve the efficiency of their internal operations, they realize that huge inefficiencies still exist for companies involved in collaborative work in a supply chain context. So, these firms began to focus on the issues of communications and collaboration with suppliers, distributors and customers. SCM has evolved under such circumstances as a solution to improve the productivity of the total supply chain beyond the company's border.

Today, some main goals of SCM are as follows: on-time delivery for improved customer satisfaction, increased throughput of the entire supply chain (not of a single plant), reduced cycle times, minimized costs, and centralized planning and distribution execution.

Today, most SCM software tend to include the following sub-components:

### ***Advanced Planning and Scheduling (APS)***

This is a planning tool to create tactical, mid to long term plans and sourcing decisions that takes the complete supply network into consideration.

### ***Transportation Management***

This function provides the optimum and executable truck-loading plan for distributing the product to supply chain.

### ***Distribution and Deployment***

This is a planning tool to rebalance and optimize the distribution network during execution. Here VMI is taken into account for the optimization.

### ***Production Planning***

This involves production planning and shop floor scheduling using dynamic pegging and optimization techniques.

### ***Available-to-Promise***

This is a quick material availability check that considers allocations, production, transportation capacities and costs in the total supply chain network.

### ***Supply Chain Modeler***

This is an easy-to-use graphical tool for modeling, navigating and controlling the supply chain network. An alert monitoring function to detect exceptions in the total supply chain network is usually provided.

### ***Optimizer***

The optimizer is the heart of the SCM system. It includes linear and integer programming, non-linear programming, heuristics and genetic algorithms.

Genetic algorithm is a computing technology for searching the best solution among the millions of possible combination of parameters. By mimicking the heredity of animals, the algorithm creates the next generation candidates (children) by combining some of the best candidates of the current generation (parent). Filtering through several generations by dropping the unwanted candidates and keeping only the good candidates yields the best (or nearly the best) candidate much sooner than searching exhaustively in the solution space. Production scheduling is one of the fields where genetic algorithm has been practically and successfully applied.

A methodology called Constraint Programming and/or Theory of Constraints is also adopted by SCM. This method has been available theoretically for more than ten years. However, users had to wait for greater computational power, which helped to make them practically useful in the real business world in recent years.

### **SCEM (Supply Chain Event Management)**

While many people classify SCEM as part of SCM, however, SCEM is a tool that can be implemented separately from the other SCM components. By itself, SCEM is quite new in the application software market. Many software vendors are now developing or piloting it with some customers.

Generally, after a plan has been completed, the plan is sent for execution. To check if the execution performed smoothly, monitoring of the execution against the plan is required. For example, when a production plan is created based on the customer demand forecast, the production plan is sent to manufacturing. Then, manufacturing needs to be monitored for any problems. SCEM provides this monitoring function by connecting many systems of suppliers, manufacturers, dealers, and retailers. The user needs to define the events, which they want to monitor and provide plan data as the initial input. SCEM gathers information from different systems at the various events. Then the status at these events is compared with the original plan. If a status provided at some event is equal to the plan, the system does not do anything but just records the result. This is the normal case, which happens in more than 80 percent of the events, and in some cases as high as 99.9 percent. However, when the status data gathered at an event are different from the plan, SCEM sends an alert message to a human operator to take some action or it can automatically initiate some remedial action, which are pre-defined in the system. Thus, SCEM can reduce human interaction in monitoring the execution process to determine problems in the supply chain. SCEM requires EAI (Enterprise Application Integration) technologies to connect different systems and gather status information.

According to the AMR research, the SCEM market is expected to grow by 88 percent annually over the next four years.

### **CRM (Customer Relationship Management)**

CRM is a software that promotes good relationships between the company and its customers. Recently, CRM has also promoted marketing, sales and customer support. CRM is categorized into the three different types: Operational CRM, Analytical CRM and Collaborative CRM.

#### ***Operational CRM (O-CRM)***

CRM products were first evolved from Operational CRM. O-CRM includes Sales Force Automation (SFA) tools with which sales representatives can carry all the necessary information in a Note PC and bring it to the customer. Through the SFA, price estimation, check inventory and even sales order generation can be produced from the Note PC.

A Customer Interaction Center (CIC) support system is also considered as a part of O-CRM, which makes the customer support operation very productive. CIC is a system, which connects the computer system and telephone of the call center. When a telephone call is made to a service call center, the voice operator sometimes requests for the customer's number by telephone. When the operator picks up the phone to respond, the operator can see the complete customer information on the PC screen. There is no need to supply the operator with names, addresses, and past contact records every time a call is made. The product and customer databases form the core of O-CRM. Often, these information pieces are connected (or shared with) to the company's backbone ERP and/or PLM (Product Lifecycle Management system).

#### ***Analytical CRM (A-CRM)***

Analytical CRM basically includes Online Analytical Processing (OLAP), which analyzes the large amount of data stored in the Data Warehouse. A-CRM is targeted to analyze especially the sales information of the products sold, and the customer's purchase and claim information gathered from the ERP or O-CRM. An example of such sales analysis is to find out the sales trend of products by season, by region, by customer or by age and so on. As a result, the sales person can improve the success ratio of sales per customer contact. The analysis on service history and claims from the customer can be used to improve the current product as well as the development of future products. The availability of powerful computing power through small computers has made this type of software very useful and popular.

#### ***Collaborative CRM (C-CRM)***

The big wave of web technology hit the CRM arena and Collaborative CRM is born. C-CRM includes all kinds of customer contact support through the Internet home pages or e-mail in marketing, product sales and customer support. Cellular phones and PDAs are also used for customer contacts in C-CRM.

#### ***PLM (Product Lifecycle Management)***

PLM is a tool to manage the product information for its total lifecycle, design, engineering, manufacturing, sales, service and maintenance. The software in this area evolved from Engineering Data Management (EDM), Product Data Management (PDM), Asset Data Management (ADM), which are departmental software used mainly in the design and engineering departments. By adding the scope of lifecycle to these old concepts, PLM was established as the core business software for the whole enterprise. PLM generally includes the following sub components:

#### ***Product Information and Integrated Bill of Materials (BOM)***

These are the essence of the company's product information. This information is generated by the product design department and shared with the production, sales, costing and service departments. Easy operation to browse this information from the Graphical User Interface (GUI) or Web browser accelerates the use of the system beyond design and engineering. Recent technology makes it possible to define the departmental view to the integrated BOM.

#### ***Document Management and Visualization***

Much important product information can be obtained from various kinds of documents. So far, drawings are the most important information about a product and its

components. When the drawings, which used to be stored as paper based, became computerized, an information system to control the data handling of such computerized drawings was established. The handling of 3-dimensional document or model is still very difficult from the PLM document management point of view.

There are other kinds of documents and image information, which describe the product. Such information is stored centrally in PLM and accessible to all departments via the network. The visualization tool embedded in the BOM viewer makes it possible to view the drawings when searching materials from the BOM.

### ***Engineering Change Management (ECM)***

To be expected, engineers change drawings and the BOM very often when the product is in the test or prototype phase. ECM supports such changes to become effective to the downstream department. Release control makes the changed information available for the related departments that use them.

### ***Configuration Management***

Configuration management manages the product information as designed, as engineered, as manufactured, as sold, or as maintained. This makes it possible to store and retrieve the history of any product configuration changes in its lifecycle.

### ***Variant Configurator***

The variant configurator is a tool to support Build to Order (BTO) manufacturing. Consumer products like the PC and automobiles can have a variety of options which consumers can select when buying products. In the case of an automobile, a customer can select, for example, color, fabric of seats, engine power, car stereo, air conditioner, sunroof, transmission, and so on. In such cases, the variant configurator helps to check the consistency of the consumer's selections (excluding the prohibited combinations), and generate the required BOM for the specific customer's selection dynamically. This tool can be used in calculating the price for such products based on the customer's selection.

### ***Computer Aided Design (CAD) Integration***

For product design engineers, it has been a tough act to maintain the data of CAD drawings and BOM in separate systems. CAD is a graphical tool, which is meant for storing character information such as BOM and material master data. The CAD integration tool enables the user to create BOM and CAD information at the same time in an integrated user screen without even knowing where the data is stored. Some intermediate programming sets added to CAD system makes the communication with the PLM possible, and users can retrieve the material and BOM master data without switching the screen from CAD to PLM.

### ***Collaborative Engineering***

Collaborative engineering tools are used to exchange production information between design engineer and supplier or sub-contractor through the Internet. Data update of the drawings and BOMs by the subcontractors through the Internet is also supported with change management capability.

### ***E-Commerce, Business-to-Business (B2B)***

The Internet and web technology are now deeply woven into our daily lives. It seems that people can no longer live without the Internet once they use it, just like the television



or telephone.

An example of a business use of the Internet is e-commerce. When referring to e-commerce, people would think of Internet shopping. In this case, the communication is between a company and consumers. This is defined as Business to Consumer or B2C. Some examples of B2C can be seen in Amazon.com and Dell where the end consumer buys products from the Internet. So far, the early successful examples of e-commerce are mostly found in the B2C area. Now, it is believed that the next big wave of e-commerce should come from the B2B area. There are several business operations where the Internet can play a big role in B2B. A few examples of these are provided below.

### ***Maintenance Repair and Operation (MRO)***

Generally, MRO is used for the ad-hoc purchasing of plant maintenance parts or office supplies such as notebooks or stationery. In MRO purchasing, the purchase requirement usually comes from the manual interaction with a human operator who is actually requesting the purchase. It is a day-to-day purchasing, but it is not purchased in bulk unlike direct material purchasing for production. Before B2B procurement, those who need some goods in the office or plant must submit the purchase requisition form on paper, which, after several managers' signatures, goes to the purchasing department. The goods are then finally ordered. For B2B procurement, purchasers log onto the Internet, select the required goods from an online catalogue and create a purchase order in the Intranet. The workflow then sends the request to the appropriate manager for approval and after that, the order goes to the suppliers without bothering the purchasing department. This reduces the labor cost at the purchasing department when handling ad-hoc purchase orders.

### ***Direct Material Purchasing***

Many companies are now trying to find ways of reducing the cost of direct materials purchased for production in their plants. In manufacturing companies, the required materials are usually calculated based on the production plan and the BOM. Then the result is sent via Electric Data Interchange (EDI) to individual vendors. But EDI transaction is quite costly compared to the Internet. In addition, the data, which can be transferred via EDI, is limited. An example of the use of the Internet and XML (eXtensible Markup Language) technology in the purchase order information exchange is Rosettanet. Rosettanet is a consortium started in the U.S. between electronic and IT companies such as IBM, HP, Dell, Intel and Microsoft. This consortium is presently trying to establish some global standard business practices across industries so that many member companies can exchange business information via XML. The member companies include Deutsche Bank (for settlement), and FedEx and UPS (for delivery). This movement is still in the experimental phase, but it is expected to spread to the other industries soon.

### ***E-Marketplace***

The e-Marketplace is an Internet portal where companies can exchange materials. For example, when a PC manufacturer wants to buy CPU chips at the lowest price, they announce the required material and quantity in the market place. Then parts suppliers will look at it and enter their offer prices and delivery dates. There are many such e-Marketplaces born since the year 2000. These are mostly targeted at some specific industry, for example, 'Converge' for High Tech Industry and 'Covisint' for the automotives industry. There is now stiff competition among similar e-Marketplaces as they become more efficient and useful with more member companies participating. It will require some more time to reveal who will emerge the winner in this marketplace.

## **RECOMMENDATIONS FOR SMEs**

The success stories of these new software implementations usually come from the large companies, mainly in the U.S. Asian companies, especially the SMEs, are unfortunately not among them. The reasons for this are: the latest software is quite expensive for the SMEs, many of the latest IT come from the U.S., and IT infrastructure in Asia is not advanced enough to support the total business system. Nonetheless, in this section, some recommendations are offered. These recommendations incur relatively small investment. Sometimes no investment is required to achieve some of the goals, similar to those of the successful companies.

### **SCM**

For a company, which is a local subsidiary of a large global company, planning to implement a global SCM, then it is better to follow the headquarter's plan. By doing so, it can enjoy the benefits of the total SCM of the parent company. If the company happens to be a supplier or distributor of a global company planning to implement the SCM, then it is best to join the same system. In this case, maximum benefits can be derived from the global SCM system implementation. The total SCM or SCEM is only valid if it is implemented on the total supply chain. If the company is neither of the above and is only a small company, then perhaps an SCM project should not be considered at all. Regardless of this, the company's productivity can still be improved by just adopting some of the concepts and methodologies used in the SCM even without the most advanced IT products. Some examples are provided below:

#### ***Focus on End Consumers***

At one end of the supply chain, there are the end consumers. Being far away from the end consumers in a supply chain invariably means that only orders and demands of the direct customers are attended to. However, the direct customer's demand can be misleading sometimes. Many assumptions and expectations of all the members of the supply chain are imbedded in the direct customer's demand. There are also some time delays existing in a long supply chain. These delays and expectations make the demand of the direct customer highly variable as demonstrated through the 'Bullwhip effect'. However, by concentrating on the end consumer's demand, one can work as a team with all the members in the supply chain, gather the end consumer's actual purchasing records at the retail level, and share the information with all the members of the supply chain. With this, all the members of the supply chain can then work in harmony to achieve the same goal, that is, to satisfy the end consumer with minimum inventory in the supply chain's pipeline.

#### ***Focus on Cash Flow Rather than Product Cost Calculation***

If plant managers are evaluated on performance such as high machine utilization and low product cost, then the organization's productivity can be improved by changing the performance measures of the plant managers. Both of these indicators are valid only when demand is greater than production. That is not so in the competitive market in the 21<sup>st</sup> Century. Should there be some products produced up to the maximum capacity of the plant, then the machine utilization is the highest and the subsequent product cost the lowest. Normally, any plant manager should be very happy for this. However, if the finished goods are piled up in the inventory yard unshipped, then the company ends up paying for the raw materials purchased and precious capital is tied until the products are

shipped and sold. In the balance sheet, the inventory value based on the product costing is categorized as an asset. In short, some profit is recorded even without selling the products. In reality, no cash is transacted until the products are sold. This is described as the illusion of the balance sheet. Under the SCM concept, any cash flow is maximized when production equals sales, regardless of plant capacity. Production is synchronized to the sales, then inventory can be reduced and cash can be increased to the maximum level. IT can help to achieve this synchronization. Even without any sophisticated IT, new performance measurement rules can still be introduced for plant managers to help improve the company's productivity. All plant managers should be evaluated based on the plant's cash flow rather than by the capacity utilization. As such, the production concepts of MTO and BTO became popular to achieve minimum or no product inventory.

### ***Speed (Agility) is Important***

When competing with global competitors, the most powerful weapon is speed in every aspect of the business. To develop a new product, speed is also a very important business process. Suppose that there are two companies making cars to sell in the global market. Company 'A' needs 25 months to develop a new car, and company 'B' needs only 20 months. To decide the next model's concept, both car manufacturers need to gather the customers' latest tastes and demands that change with time. To start to sell the car at the same time in 25 months' time, Company 'A' must start the concept design based on the information gathered, but Company 'B' can supply some more up-to-date information in the next five months and start the concept design. After 25 months, Company 'B' can introduce the car, which is clearly closer to the customer's taste at that time.

The time reduction from sales order receipt to shipment is also very important in SCM. However, this must be achieved without incurring huge product inventories. Of course, products can be shipped immediately only if the products are already held in storage, and have not been allocated to any customer. In the ideal, the greater need is to reduce the cycle time of making the products and to minimize unnecessary inventory storage. To achieve this, it is imperative that the manufacturing processes be simplified and the number of components must be reduced. Of course, some components have to be kept based on the product demand forecast. The component level that is stored as inventory ought to be for the most common components of the various product models. The production lead time for the stored component level needs to be short enough for the customer to want to wait for the finished goods. If there are some attachment parts, which fulfill the final customer's requirements, then these parts should be planned for final assembly just before the shipment or even after the shipment to the dealers. This strategy is called 'Postponement'. In doing so, the cycle time from sales order to shipment can effectively be reduced without compromising on increasing the product inventory.

### ***Reduce Waiting Times***

To increase the speed of production, it is necessary to reduce the waiting time of the inventory in the plant. There are three kinds of waiting times in a plant. They are (1) waiting time for tool and die changes, (2) waiting time for available capacity, (3) waiting time due to large batch sizes.

The reduction in waiting time for tool and die set-up changes requires special know-how and skill on the shop floor. Typically, to fulfill the various customer requirements, a manufacturer needs to include various product models. To produce the different models for the same product line, some tools and die still need to be changed. Conventionally, frequent changes of tools and dies are avoided to save the set-up waiting time. However,

this necessitates a larger production lot size. This is not a very good proposition under SCM. Rather than increasing the lot size, the set-up time for tool and die changes needs to be minimized. In this regard, Toyota has been very successful in reducing the set-up times.

To reduce the waiting time requires some investment. If some work in progress (WIP) is waiting in a big queue in front of a machine, there is a need to invest some capital to increase the capacity of that machine. Determining such bottlenecks in the production process obviously becomes very important.

If products or goods were to be simply manufactured under a large lot just to reduce cost in one process, it is natural that inventories will pile up while waiting for the next process to begin. This waiting time is created by the large lot size. Reducing the lot size can lead to a reduction in the inventory and waiting time. This is true also for the final assembly stage. If the finished goods are produced in a large lot, these will just stay at the holding yard waiting for shipment. Therefore, reducing the lot size can make the production plan more flexible.

### ***Integration vs. Distribution***

One of the advantages for SMEs is that the organization is not too big to share information and work together with all the members in the company towards the same goal. In a large company, to be fair, each department is so isolated that it is very difficult to work together towards sharing information. Each department, such as design, production, purchasing, sales and accounting, has its own information system. Some corporate master data such as product master data are stored in various places in the company. Sometimes they vary from one department to the other. These separate systems make business process re-engineering and improvement very difficult. In contrast, with SMEs, the departmental barriers are much lower and it is much easier to integrate all the information systems in an SME. ERP provides a solution to such corporate wide integrated business system requirements for SMEs. If one of the departments of the company is planning to replace its current departmental business system, then it is advisable to start by replacing all the departmental systems with an integrated ERP.

### **Other Applications: Best of Breed vs. Single Vendor Integration**

As mentioned in the previous section, there are various kinds of business application software packages available in the market. Many companies usually decide to implement such software packages after the main user department has done the selection. As the result, some of these application software are used within a department rather than at the corporate level. Other companies select the best product in each business application area and connect them with the EAI tool. This is called the Best of Breed (BOB) strategy and became popular among some large companies in the U.S. However, this strategy is recommended only to the very large companies who have enough resources to connect these different application software developed by different vendors and implemented separately at different times. The effort required to integrate these different systems developed by different software vendors is much harder than what people usually imagine. Even with the latest EAI tools, users need to define the corresponding data fields in the two systems item by item. Even if the two different systems can be integrated albeit with much difficulty, the need to maintain the same master data in the two separate systems even after integration will still prevail. That is a nuisance and a cause of inconsistency. One suggestion is that SMEs should forget about the BOB concept. To use the latest CRM, SCM, or PLM, SMEs should make the communication between the different systems as minimal as possible.

On the other hand, if SMEs are planning to implement an e-Commerce application, it is important that the front-end system, which supports the customer interface, be fully integrated with the back office order entry system. If these two systems are separate, much time can be wasted in performing manual work for the order fulfillment. Should an online shop become successful, then some automatic (real-time) integration between the e-commerce web site and the back office order fulfillment system becomes necessary.

## **CONCLUSION**

Currently, some computer magazines contain articles about success stories of companies using the most advanced IT, which has improved a company's productivity or supply chain. IT managers in SMEs who read these articles are naturally tempted to follow these success stories. However, these advanced IT systems require a large capital investment that can only be afforded by the large companies. For SMEs, there are many things that can be done to improve the productivity even before implementing these advanced software packages. Many advanced software packages have their underlying theories. Hence, it is instructive to learn those theories and apply them in the company so as to have a greater chance of improving the company's productivity.

## **APPENDIX**

### **Theory of Constraints**

It is useful to explain one of the basic theories in SCM, that is, the Theory of Constraints (TOC). Goldratt has explained TOC in his book "The Goal" using a metaphor of children going on a picnic. It is worth recounting this story in this paper.

Imagine that a group of children is going to a certain destination for a lunch picnic. In this group, some children can walk faster than the rest. There is a boy who walks slowest among them. There is one adult leader who takes care of the children. His task is to make sure that all the children arrive at the destination before lunchtime.

In the beginning, the leader lets the children walk as they like, then he realizes that he cannot not take care of all the children because the group of faster children went ahead of the others and the slowest boy was soon left far behind. Not long after, the gap was increased to an uncontrollable distance. The leader also realized that some of them could not arrive at the destination before lunch, given the current speed of walking. The leader then decides to let the children walk in a line with an order. Each child must always follow the child in front, and must not pass and go ahead of him. He put the slowest boy in the center of the line. There appeared again a big gap in front of the slowest boy, while the line after him was kept in order. The total walking speed of the entire group was same as before. Then he noticed the slowest boy was carrying a heavy sack. He divided the contents of the sack into several small portions and let the other faster children carry them. Finally, the walking speed of the slowest boy was increased, and the speed of the entire group became faster than before. As a result, all the children managed to reach the destination by lunchtime.

A similar situation exists in the plant with many different types of machines where materials move from one machine to the next until at the end, finished goods come out. The analogy becomes obvious when the children are replaced with machines and the walking speed of each child with the processing speed of each machine. Also, the lead

time required to arrive at the destination for the children is the lead time required to produce the final goods from the input materials in the plant and the gap in front of the slowest boy is the pile of WIP materials in front of the slowest processing machine. The slowest machine becomes the bottleneck of the entire productivity of the plant. The productivity of the plant cannot be improved unless the speed of the slowest machine is increased. The processing speed increase of the other machines before the bottleneck leads to a big pile of semi-finished goods in front of the bottleneck. Any speed increase of another machine after the bottleneck only increases the idle time of that machine.

By extracting a heuristic out of this story, Goldratt describes the following five steps to improving productivity:

1. Identify the system's constraints (or bottlenecks)
2. Decide how to exploit the system's constraints
3. Subordinate everything else to the above decision
4. Elevate the system's constraints
5. If in the previous steps the constraint is broken, go back to step 1

# VALUE PROPOSITION THROUGH CROSS-COMPANY PROCESS INNOVATION: OPTIMIZATION OF IT ENABLING TECHNOLOGY

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## INTRODUCTION

With increasing competitive pressure, many leading firms are struggling to establish their competitive advantage by optimizing their internal and external processes throughout their supply chain. In particular, effective supply chain management (SCM) is receiving more attention than before. It has been known that the preliminary for effective SCM is to optimize their internal processes, i.e., inter-functional integration. By now, more than half of the Fortune 500 companies have implemented Enterprise Resource Planning (ERP) systems for that purpose. ERP has been known as a tool for a firm to integrate their work processes from order processing to delivery while monitoring the whole process. In general, they spent around a million dollars and one to two years implementing the system. While they spend lots of capital and other resources, the success stories have been rarely reported. Also, in those success stories, financial figures were reported instead of specific operating performance of ERP implementation. It is not easy to pinpoint the contributing factors of those successful stories for the following reasons. First, the ERP implementation process involves various dimensions. Second, the scope and functionality of the ERP system have been evolving continuously. And, lastly, the impact of the ERP implementation varies vertically and horizontally depending on the focus and process of the ERP implementation efforts. Considering the amount of investment expended on ERP implementation, it is imperative to identify the critical success factors as well as the impact of ERP implementation on a firm's competitive position.

There are many studies on IT application from different perspectives. Some identified IT implementation as a critical success factor for enhancing a firm's competitive position or benefits. Others evaluated the contribution of IT application to firm's competitive position using generic IT application rather than a specific domain of IT application. Also, in most cases, a traditional supply chain structure is assumed rather than the evolution path of the supply chain structure.

When we propose a way to utilize the IT enabling characteristics to enhance the supply chain capability, we must consider the participant's supply chain and its structure: what are the roles of the participant, what is the topology of the supply chain, and how they cooperate with each other. The purposes of this article are as follows. First, the evolving path of the supply chain structure is proposed based on literature. Second, the scope and enabling characteristics of a generic ERP system is studied along with its evolutionary path. Third, the process domain and direction are proposed in order to improve supply chain performance. Finally, the process domain and gap are identified along with the implementation process.

## LITERATURE REVIEW

The literature is summarized into two groups: one for the evolution path of the supply chain structure and the other for the application of IT in supply chain enhancement including methodology.

### Evolution Path of Supply Chain Structure

In the past, having product variety and full functionality (including product development, production and logistics, and marketing) used to be one of the core capabilities of manufacturing firms. However, the market environment has since changed rapidly propelled by IT advancement and new business models. Hagel III and Singer (1999) mentioned that interaction costs determine the way companies organize themselves and the way they form relationships with each other. The use of IT dramatically reduced this cost and a totally new business model emerged, for example, the Model E site. Model E's slogan is to let customers design their own vehicles. The virtual design team and assembly network of Model E will then manufacture and deliver the vehicles customers. Model E does not have any permanent functional department, such as manufacturing plant or design laboratory. Model E forms the network as soon as they receive customer orders.

We now observe how the firm's business structure evolved and what are the major themes during the evolution. Table 1 shows the firm's business structure and how the span of processes has evolved. The evolution stage is reviewed from four perspectives, namely, market environment, business theme, economic initiative, and supplier relationship. Market environment defines the balance between supply and demand. Business theme describes the level of process span and product or market variety. Economic initiative describes the underlying principle for their operations or economic value the firm pursues. Finally, supplier relationship describes the way the firm interacts with their major supplier base. The literature on the firm's internal span of processes was reviewed to identify the direction and rationale for spinning off more supporting functions. The literature on supplier base topology was reviewed to see the evolution of supplier base structure. The literature on inter-organizational relationship was reviewed to define virtuality according to environmental change.

**Table 1: Evolution of Firms' Business Structure**

	30's through 70's	80's	90's
Market Environment	Seller's market	Maintain balance	Buyer's market
Business Theme	Vertical integration	Horizontal expansion	Focus and slim
Economic Initiative	Economies of scale	Economies of scope	Economies of speed
Supplier Relationship	Permanent relationship	Market relationship	Alliance & partnership

### Span of Internal Processes

Traditionally, the span of a firm's internal processes relates to the make/buy decision. Simply, the determinants were purchasing cost and in-house production cost in the era of mass production. However, as more determinants were considered, a key decision measure such as the level of required control for cost and quality of product and logistics services become more important than the simple purchasing cost. The cost of maintaining the required level of control contributes significantly to the interaction cost. Given these issues, we reviewed and summarized three typical literature groups: process enterprise,



inter-organizational process, and process disintegration.

In order to respond to customer requirements, the related functions should be integrated with one consistent objective. Firms define such process as order-fulfillment process. However, in a functional organization, it is not easy to superimpose a single running process crossing fragmented functional organizations. In this sense, Hammer and Stanton (1999) stated that in a process enterprise, the key structural issue is no longer centralization versus decentralization; it is process standardization versus process diversity. They proposed a process organization with process ownership. The implication of the process-oriented literature is that most of the functionalities or activities needed for fulfilling customer orders should be conducted internally without any bottleneck.

Holmstrom et al. (1999) brought another view about the span of process. In a serial supply chain, there are process duplications in each link. The buyer has to undertake certain activities to purchase products from the supplier. The supplier, also, has to perform certain activities to sell products to the buyer. Some of these activities are duplicated. If these non-value added activities are eliminated, the supplier can increase the value to the buyer as well as optimize and streamline its own internal processes. One way to increase the value between the buyer and the seller is to reorganize the span of processes between firms in the supply chain.

Hagel III and Singer (1999) proposed totally different perspectives. They defined three “businesses”: customer relationship management, infrastructure management, and product innovation (see Table 2). Formerly these three functions were considered as basic and necessary for the minimum span of internal processes for any firm, in particular, for manufacturing firms. However, they found that there exist conflicts among the three functions so they called each function a business, which implies that the three businesses cannot effectively coexist within a firm. To state it in another way, each business can exist only as a single business.

A running business model, namely the Model E site, is used to justify their arguments. The Model E site does not have any production or product development function. Even though they are offering several vehicle-related services, such as insurance, plate registration, etc., those services are for them to build and maintain customer relationships. That means, the Model E site is running the customer relationship management business.

**Table 2: Rethinking Traditional Organizations**

	<b>Customer Relationship</b>	<b>Infrastructure</b>	<b>Product Innovation</b>
<b>Roles</b>	Identify, attract and build relationships with customers	Build and manage facilities for high-volume, repetitive operational tasks	Conceive attractive new products and services and commercialize them
<b>Economics</b>	Economies of scope	Economies of scale	Early market entry
<b>Culture</b>	Customer-oriented	Cost focused	Employee-centered
<b>Competition</b>	Battle for scope	Battle for scale	Battle for talent / speed

### **Supplier Base Topology**

The supplier base topology and the inter-organizational relationship have close correlation. In some sense, the type of inter-organizational relationship policy determines the structure of the supplier base structure or topology. Like Ford in the early 70's, the inter-organizational relationship was sole and permanent by ownership and the supplier

base structure was a single serial chain. Formerly, in the purchasing related literature, one of the major research issues was what were the determinants of sole sourcing and dual or multiple sourcing. As we extend the issue further down the supply chain, the supplier base topology can be defined. That means we can define the topology by defining how many subordinate each branch has and its reverse, i.e., cardinality. If the cardinality between upstream member and downstream member is one to one, we define the topology as a vertically integrated serial chain. If the cardinality between upstream and downstream is 'n to n,' we define this topology as a network.

The literature on supplier base management falls into two categories: one is about how to define roles, responsibilities, and coordination mechanism along the serial supply chain, and the other is about the evolution stage or the desired supplier base topology. Many a literature on SCM focused on the integration issue in supply chain members in order to increase the firm's competitiveness. The theme is to maintain information transparency among the serial supply chain by utilizing IT and process extension. Another focus is on postponement or 'make-to-order' strategy in relation to supplier base management.

Pagh and Cooper (1998) classified four particular strategies on the continuum between pure speculation and pure postponement. In addition to the concept of profile analysis, they added that the structure of the supplier base and the types of relationship among the supply chain partners should be considered in deciding which strategy to pursue. Hoek (1998) extended the concept and proposed a role map and supplier base structure along with a firm's globalization strategy. He defined three strategies: globalization, internationalization, and localization. Other than inventory positioning strategy along with the three strategic frameworks, he proposed a role map for each level in serial supply chain participants. Along with the role map, firms can choose the right structure of their supplier base for their operational effectiveness and efficiency. Hoek, Commandeur and Vos (1998) also proposed an evolution map for the supplier base structure. As a firm's design principle moves from functional, geographical, and product department to processes and shifts from mass production and mass marketing to mass customization, the supplier base structure moves from command and control, i.e., permanent and serial chain to a network organization.

### **Inter-organizational Relationship**

As mentioned, the inter-organizational relationship has close correlation with the supplier base structure. They have 'cause and effect' relationships. Christopher (1998) described four stages in the supplier base transformation process: baseline organization, functionally integrated organization, internally integrated organization, and externally integrated organization. Here, we focus our attention on the types of inter-organizational relationship along the four evolution stages. From pure market-based relationship with supplier base in the baseline organization, firms start interacting with their supplier base in order to synchronize the supply process in the externally integrated company. That implies firms start to exchange information with their supplier base by developing supplier-networking groups. It means that as firms expand their coordination domain, they develop more stable and close inter-organizational relationships.

Bal, Wilding, and Gundry (1999) quoted Nishiguchi (1994) in explaining the three ways of classifying networks (see Table 3). The three classes of networks go with the way firms maintain their inter-organizational relationships. For example, in the vertical integration class, a firm maintains a permanent relationship with its supplier base by ownership. In the strategic dualism, firm develop and control stable relationships with its

supplier base with large-scale information exchange. The third class of networks, which is the hierarchical structure, firms only control immediate subordinate tier while the second tier controls the third tier and so on, which is typical in the Japanese auto industry.

**Table 3: Three Classes of Networks**

<b>Classification</b>	<b>Characteristics</b>	<b>Example</b>
Vertical Integration	Owns most of its supply network	GM
Strategic Dualism	Retains key production areas, but outsources components	Chrysler
Clustered Control	Deals with a first tier who manages the second tier and so on	BMW

They further proposed a fourth type of network, which maximizes the benefits of close regional contacts and strong ties between resources. The three advantages of the fourth type of network are: the potential for more face-to-face interaction, a degree of trust for operational performance, and an experience base. Their proposition is that the fourth type of network improves the firm's agility. However, their proposition of the fourth type of network still stays in stable inter-organizational relationships.

Carr (1999) proposed a 'work shuttle' concept. He mentioned that the pressure to be virtual, i.e. to produce real products and deliver valuable services without many fixed assets, is becoming too strong to resist. It implies that firms may have to eliminate the fixed cost and the cost of maintaining permanent or stable inter-organizational relationship may be one of the fixed costs that need to be eliminated. The 'work shuttle' concept implies ad-hoc relationship among the buyers and suppliers, that is, the transaction between the buyer and the service provider is not permanent, rather, the inter-organizational relationship is temporary or virtual. Chandrashekar and Schary (1999) defined virtuality in three ways. First, virtuality refers to all computer communication substituting for human participation. A second meaning is the concept of supra-organization, with each partner focused on one specific task. A third meaning is the development of organizations joined primarily through computer-mediated communication networks.

### **IT Application and Methodology**

The literature on supply chain classifies IT into two groups: one for IT application along with SCM and the other for the methodology for the implementation of IT applications.

### **Supply Chain Management and Related IT System Functionality**

The scope and theme of SCM have evolved over the last three decades (Evans and Danks, 1998), from internal-oriented to external-oriented. Now it has extended beyond a particular firm's boundary and country. Further, the domain of SCM has evolved from operational or transaction level to managerial and strategic level. On that line, supporting technology has evolved, too, along with IT. The domain of SCM related IT applications was limited to transaction-oriented areas such as inventory management, order processing, etc., i.e., the IT application was limited to a specific function-oriented system. It may be called an automation era, which merely replaced repetitive manual jobs. Also, there were no critical process or domain that has a competitive impact other than increasing transaction efficiency such that the only management focus was operational efficiency.

As competitive pressure diffused globally, the focus of SCM was extended

externally. SCM was no longer limited to a particular company but the scope of SCM was extended to include upstream channel members, i.e., supplier base, as well as downstream channel members, i.e., distribution channel members. Also, the management focus has evolved from efficiency to effectiveness, such as the concept of Effective Customer Response (ECR). In terms of increasing channel efficiency, cost management and logistics process cut through the whole supply chain and cross firm's boundary. In order to maintain inter-organization communication channel, internal logistics processes and related accounting process were integrated. The decade was one of integration. The supporting IT evolved too. Emergence of database and networking technology has enabled information sharing and streamlining of cross-organization processes. ERP and other inter-organizational integration tools such as EDI and various Internet related solutions were developed. According to studies done in the mid 90's, the inter-organization IT application was still at the beginning stage (Gustin 1995; House and Jackson 1995; Waller 1995).

However, as we move into the 21<sup>st</sup> Century, IT application and usage will play a critical role in developing business strategies and handling transactions moving the business world into an IT enabling competitive era. In pursuing the strategic alignment with other businesses, four dimensions of SCM strategy were proposed. These are customer service, demand flow, sourcing, and supply chain integration strategy. For each dimension, the supporting IT application has been developed and part of them has been implemented. The supporting IT applications are classified by their roles in SCM (Stenger 1986). The typical dimensions that come under the four levels in the IT application layers are strategic, tactical, operational and infrastructure. ERP resided at the transactional level but has been extending upwards and downwards in the hierarchy.

### ***Implementation Methodology of IT Applications***

After the mid-80's followed by Strategic Information System Planning (SISP) approaches, many studies proposed methodologies to eliminate the gap and enhance the firm's core capability along with their business strategies. Most of the studies were based on previous functional-oriented system such as MRP, CAD/CAM, etc. Kwon and Zmud (1987) categorized the previous works into three areas: factor research, process research, and political research. Factor research examines a particular set of factors that impact on IT implementation effectiveness and efficiencies (Fuerst and Cheny 1983, Schultz 1984, Sanders and Courtney 1985). Most popular factors can be classified into four dimensions: strategy alignment, target process adjustment, human resource and organization alignment, and technical forces. In addition to the four dimensions, the related infrastructure dimension should be added as it plays a critical role in the implementation as well as post-implementation stage. Process research studies the key dimensions and methods in the IT implementation process (Ginzberg 1979, DeSanctis and Courtney 1983). It focuses on the methodological aspects such as planning process, requirement analysis process, etc. Political research focuses on the socio-technical aspect of IT implementation (Markus 1983). The socio-technical aspect includes organization change management, which concerns the reactions of interest groups and suggests ways of handling organizational conflicts during the implementation and operation stages of IT applications. The three approaches are mutually complementary. It is imperative for the process approach to be the backbone of the IT application implementation process.

Along each stage or throughout a stream of stages, some factors and socio-technological approaches are necessary for successful implementation. Thus, it is important to identify the factors and kind of socio-technological approach needed at the implementation stage. For example, top management commitment and involvement is

critical for establishing overall planning throughout the stabilization process. Also, from the onset, a well-planned and capable organization change management process is critical for success. The success of the ERP implementation depends on not only the ERP functionality; but also it is the result of sound strategy development, process optimization, human and organization alignment, and related infrastructure establishment.

## **RESEARCH MODEL AND METHODOLOGY**

### **Value Proposition Through Collaboration**

Lee, Padmanabhan and Whang (1997) mentioned that most of the waste and inefficiency in the supply chain come from the turbulence within supply chain known as ‘The Bullwhip Effect’ in the supply chain. They investigated the reasons for this turbulence and categorized them into four areas (see Table 4).

**Table 4: Areas of Causes for Bullwhip Effect**

<b>Domain</b>	<b>Area</b>	<b>Causes</b>
Inter-functional	Marketing	Promotion & Pricing Policy
	Accounting	Credit & Collection Policy
	Production	Production & Purchasing Lot
	Sales & Distribution	Forecasting & Distribution Policy
Inter-organization	Gaming Rationale	Consideration of Buffer
	Over Respond	Individual Expectations

In other words, the bullwhip effect occurs whenever there are inconsistencies in decision-making and information gap among functions and inter-organization. There are many ways to eliminate those effects. Streamlining of duplicated areas, proposed by Holmstrom, Hoover, Eloranta and Vasara (1999), could eliminate the inconsistency and information gap. However, there may still exist some gaps during the planning stages at each organization.

Eventually, to eliminate the gap, they have to harmonize the process from the beginning to the end, i.e. they have to collaborate throughout the whole cycle, at both the planning and transaction cycles. The planning cycle involves mid-range forecasting, resource planning, and periodic operational planning such as monthly to weekly planning. The transaction cycle involves actual transactions such as production, purchasing, shipping orders, etc. Collaboration during the planning cycle may reduce inter-functional and inter-organizational conflicts, whereas collaboration during the transaction cycle reduces information gap and instability within the supply chain. The requirements and major activities for each cycle in the collaboration cycle are summarized in Table 5.

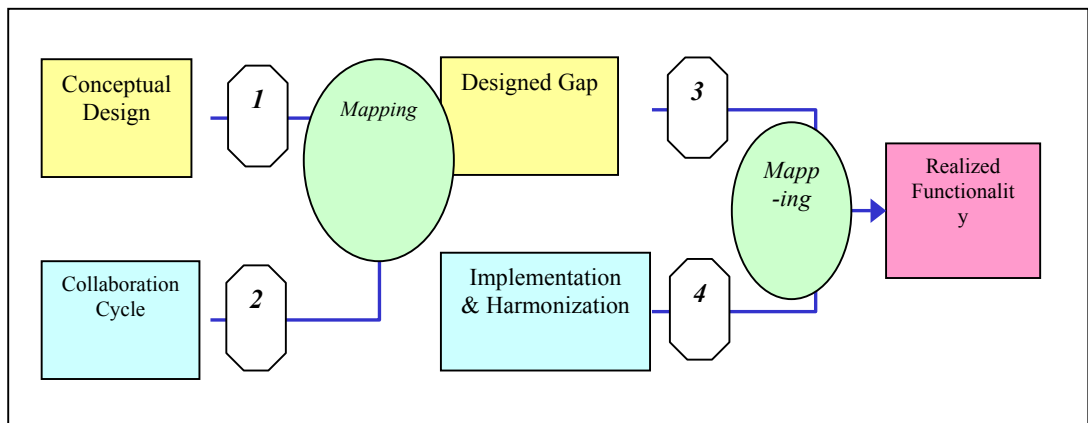
### **Analytical Procedure Model**

The purpose of this paper is not to propose the ERP implementation methodology. Rather, an analytical procedure model is developed in order to identify the gap between a set of expectations about the ERP and the realized benefits of implementing the proposed cross-company process, i.e., collaboration in the supply chain. Many gaps have been reported from ERP implementation. Some of them concern functional gaps of the package. Others concern the gap between their strategic direction and the provided capability. Most of them are not single-dimension nor caused by a single factor such as the package’s functional deficiency or lack of user involvement. In order to specify the stages and related

components, an analytical procedure model is developed as shown in Figure 1.

**Table 5: Activities and Requirements in the Collaboration Cycle**

Cycle	Major Activities / Purpose	Requirements (inter-organization)
Planning cycle	Consideration of objectives and constraints	Master data management
	Alternative and contingency planning	Interactive planning
	Multi-party-object optimization	Optimization & harmonization
	Continuous adjustment and improvement	Monitoring control function
Transaction cycle	Transaction automation on line	Transaction map management
	Transparency and information sharing	Transaction map window & DB
	Detection of mal-function and recovery	Contingent transaction management



**Figure 1: Analytical Procedure Model**

Most commercial packages are built on conceptual design based on a selected business scenario such as global integration scenario, supply chain integration scenario, etc. Most of the vendors of the commercial package build the conceptual design or blue print and promote their package using that blue print such that the perspective users perceive the conceptualized feature as alive or working. There is a time gap between the user's perception of the product and the set of working functionality provided by the package. This design gap may come from the discrepancy between the conceptual design and software development. From Figure 1, Route 1 represents the vendor's promotion and Route 2 represents the perspective user's perception or expectation from the requirements.

In this model, designed functionality means the workable functions provided by the ERP package should meet all the necessary conditions of the user. Route 3 represents the function map provided by the ERP package and Route 4 represents the required capability by the firm in order to realize the functionality provided. The capability includes the user firm's strategic direction, implementation and execution plan, related process and organization alignment, and other required change management. Whenever there exist

gaps between Routes 3 and 4, the designed functionality does not provide nor enhance the firm's competitive position as expected. The gap is called realized gap. In order to categorize the two types of gap and identify the causes, the conceptual design and the perspective user's expectation matrix is developed in the next section.

### **ERP Function Map**

ERP has been continuously evolving along with increasing business needs and related IT development. The first generation of ERP focused on internal or inter-functional integration. At its beginning stage, a typical ERP consists of four major areas, namely, logistics, logistics support, accounting, and other supporting areas. The logistics area covers order management, production, procurement and inventory management. The logistics support includes plant and quality management and human resource management. The accounting area consists of financial and managerial accounting, including asset management, investment management, cash flow management, etc. The last group usually contains an industry specific solution set such as project management, retail management.

From the IT point of view, three directions categorize the extended or new dimensions of ERP evolution. They are data communication and application interface, data warehouse and related technology, and optimization and decision support system. The three directions define three quadrants. Most of the new dimensions from the ERP packages locate among the three quadrants. EC related tools and cross-enterprise management support tools locate the first quadrant. Product Data Management (PDM) and CRM locate in the second quadrant with some relation to the interface direction. SCM tools and other optimization tools reside in the third quadrant. Based on the ERP evolution map, a contribution factor matrix is developed in Table 6. It is not possible to map every detailed functionality or enabling characteristics provided by a specific ERP package. For simplicity, the enabling characteristics are grouped into four contribution factors.

A specific functionality of the ERP may have more than one contribution factor. For example, an availability check crossing firm's boundary is enabled by the functionality, application architecture, and data architecture factors altogether.

**Table 6: Contribution Factors**

<b>Contribution Factor</b>	<b>Enabling Characteristics</b>
Functionality	Detailed functionality provided by a specific module, such as credit management, which normally lined with a related module, i.e., cross-functional processes. It also includes industry specific solution such as a solution for mill industry.
Application Architecture	Application development environment such as object-oriented approach, which enables different applications and packages to communicate without disruption or intermediaries. It also includes EDI and Internet interfaces.
Data Architecture	Data model and database architecture such as central or distributed database environment, which enables different applications or systems to share the same data or allocate the data among different databases while maintaining concurrency and consistency.
Technical Architecture	Technical architecture such as client-server environment, which enables downsizing and secures system economy. In conjunction with data distribution scenario, it helps to share and distribute data among different applications or systems.

## RESULTS AND DISCUSSIONS

The results in this section are based on a case study for a group of companies along a vertical supply chain providing electronic appliances. The implementation of the cross-company collaboration process is currently in progress after a feasibility study was done. The findings are based on the mapping results between the requirements from their cross-company collaboration processes and the conceptual solution provided for the future version as well as their experience with the current version for a leading ERP package.

The following results were obtained from the mapping including other dimensions such as process, organization, and infrastructure, and in particular, for the planning cycle (see Table 7). The mapping result for the transaction cycle is not specifically enumerated since most of the transaction cycle for the company group has been executed without significant gaps.

The benefits from the transaction cycle collaboration will be reported soon. At this point, the expected benefits are as follows:

- *Increased production stability*: by the stable flow of incoming logistics and information sharing through advanced notice and correction activities along with the real time changes;
- *Increased level of response to market change*: by adopting smaller lot size in production through time-sliced delivery or consignment arrangement; and
- *Enhanced partnership*: by the improved reliability and credibility among supply chain participants.

**Table 7: Mapping Results for Planning Cycle**

Planning Cycle			
Dimension	Specific	Gap	Status
Process	Intra & Inter-company	Need alignment and consensus	S / P
IT	Functionality	MOP Optimizer: Quality and Speed Need action bulletin board	L / P L / P
	Networking	Interaction: need more for multi-party Network capacity	L / N S / P
	Data Related	Super master data structure Data consistency maintenance	L / P L / P
Organization	Employee	Knowledge and experience	S / P
	Organization structure	Organizational alignment and restructuring	S / P
Infrastructure	Production	Production quality	L / P
	Upstream channel	Rationalization	L / P
	Downstream channel	Rationalization and coordination	L / P

L, S / P, N: Long, Short Term / Positive, Negative

The benefits from the transaction cycle collaboration contribute to the improvement of the supply chain. The enhanced partnership is also expected to facilitate the implementation process of the planning cycle collaboration. Enumeration and validation of the expected benefits from the implementation of the planning cycle collaboration is under refinement stage. However, one clear benefit from the implementation is in the area of cross-company MRP in the vertical channel. Currently, they have 5 days gap between the MRP run at the 1<sup>st</sup> level plant and the one at the 3<sup>rd</sup> level plant. Now, their planning cycle is a week and we observed several changes and adjustments during the cycle. The



turbulences and resulting wastes are huge such as product defect, late delivery, shortage, inability to meet the market change more effectively and efficiently, etc.

From the results and interim estimation observed in a specific supply chain, the following concluding remarks were reached:

*The magnitude of benefits:* the magnitude of expected benefit is much more dramatic from the planning cycle collaboration than from the transaction cycle collaboration; however, the transaction cycle collaboration is preliminary for the planning cycle collaboration;

*The key process identification:* the identification of key processes should start with the core competency from the supply chain after considering the characteristics of the specific industry. In general, the process resides in the duplicated area between each supply chain layers:

*The status of IT enablers and implementation strategy:* the exact functionality, networking, and IT related infrastructure is not mature enough to support the collaboration. However, an incremental approach is recommended in IT implementation;

*The organizational alignment and restructuring:* the enhancement of organizational capability is one of the key enablers in the implementation in terms of human resource capability and organization restructuring; and

*The infrastructure consideration and continuous improvement:* the proposed collaboration cannot be done without the relevant infrastructure improvement. The implementation of the cross-company collaboration cycle needs process innovation, whereas, the infrastructure development needs continuous improvement, i.e., they are mutually complementary rather than exclusive.

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# ISSUES FACING ASIAN SMEs AND THEIR SUPPLY CHAINS

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## INTRODUCTION

One critical aspect of running a manufacturing or service enterprise today is the need to effectively manage the complex web of subcontractors, job shops, strategic partners, and others. Such onerous coordination can make or break a company but is especially important with the continuing trend toward outsourcing, globalization and decentralization. For a single firm, especially an SME, to tread along this route is virtually impossible given the set of limited resources available. Put simply, in the new economy, it suffices to say that no enterprise is an island of itself.

Already, there is recognition that competition is rapidly shifting from a firm versus firm perspective to a supply chain versus supply chain perspective. In response to this paradigm shift, firms seeking competitive advantage are, either reactively or proactively, participating in co-operative supply chain arrangements. Essentially, they are using such mechanisms to become agile and responsive in a rapidly globalizing economy. Some of these arrangements manifest themselves in the form of strategic alliances, which reportedly seek to combine the individual strengths of the various players (firms) in the chain and their unique resources. In doing so, big enterprises become even bigger, leading to greater economies of scale in production, transportation and market size, and higher integration of the supply chain. Concurrently, small (usually localized) enterprises are further relegated down the value chain, rendering them to be mere low value added commodity players.

Indeed, strategic alliances between different actors in the supply chain have grown in importance with the recognition that suppliers can contribute expertise, which enhances competitive advantage across borders (Ellram, 1992). In doing so, synergy is derived and a symbiotic relationship is fostered. For instance, buyer-supplier sourcing relationships have been a primary focus of alliance improvement efforts, albeit at different parts of the chain, such as tier 1 and tier 2 manufacturers, and P&G and Walmart. While interest in such arrangements remains strong, it is also well accepted that creating, developing, and maintaining a successful alliance is a very daunting task. There are strong grounds to justify this reason. We will attempt to mention and elaborate on some these internal and external barriers later in the paper.

Specifically, for SMEs and their correspondent supply chains, SMEs cannot ignore the supply chain revolution and still remain competitive. Being small can be both a blessing and a curse in today's competitive business environment. Smallness in terms of firm size can help in the agility of the firm, allowing SMEs to be located and be flexible enough to move quickly from one geographical location or business to another, without the accompanying encumbrances of bureaucracy, legislation and regulations that sometimes hinder the smooth transition of the larger established MNCs. Put simply, the advantage for a small firm is that the firm can choose the supply chain it wants to be in.

However, many small businesses are simply too content to change, let alone

improve. In particular, traditional Asian SMEs are by and large conservative. Most start small and unfortunately remain that way. Business owners are unwilling to pay the upfront costs associated with new technology or continual upgrades. As a result, Asian SMEs are behind the times. For instance, Internet penetration, a much-needed event in SCM efficiency through expeditious information flow, is still low. In Japan, B2B transaction is hindered by the low 20 percent penetration rate of 20 percent among small firms. In Hong Kong, 65 percent of SMEs have not engaged in any form of B2B business. A similar percentage does not even have an email system.

Under this setting, this paper addresses several critical issues regarding that challenge of abating all barriers that can potentially impede the SMEs' attempts to become more agile and responsive in the new game of superior supply chain management. Some of these barriers are not only logistical in nature but also commercial in structure.

Thus, the rest of the paper is organized as follows. Section 2 addresses the various forms of co-operative relationships found in the supply chain today, with particular reference to alliances or consorting among the SME players. Section 3 then develops the notion of barriers, especially that of the external environment, i.e. geographical, political, legal and economic, either to the firm or the whole chain. This is in contrast to the internal environmental barriers faced by a firm within a supply chain, i.e., management systems, functional structure, organizational culture, and inter-departmental relationships. It further introduces barriers unique to Asian SMEs. Section 4 then proceeds to prescribe some practical measures to reduce the effects of these barriers to improve efficiency in the supply chain. The roles and actions of the different players in the supply chain, i.e. the chain partners and public sector agencies are highlighted. Section 5 proceeds with an account of how Singapore has employed some strategic courses of action to help firms overcome such barriers either directly or indirectly. The specific roles of the Trade Development Board (TDB), and the Productivity and Standards Board (PSB) in nurturing and providing the best environment for supporting SCM performance of local SMEs are mentioned in Section 6. The paper then concludes with Section 7.

## **CO-OPERATIVE RELATIONSHIPS BETWEEN SUPPLY CHAIN PARTNERS**

As noted by Corbett et al. (1999), the open exchange of information and coordinated decision making typical of a long-term supply-chain partnership can reduce the inefficiencies inherent in less collaborative relationships, such as excess inventories and slow response. Different from project-based partnerships, supply-chain partnerships are typically characterized by a level of investment that further improves the joint supply chain productivity to mutual advantage. A good example of this productive engagement is that of Hewlett Packard and Venture Manufacturing. In the case of a traditional buyer-seller relationship setting, well-managed and organized strategic alliances enable buying and supplying firms to combine their individual strengths and work together to reduce non value-adding activities and facilitate improved supply chain performance. The more open-ended nature of supply-chain partnerships makes them more challenging, particularly when it involves cross cultural, cross national boundaries and cross organization issues where SMEs have little or no experience in.

The notion of co-operative relationships has been receiving increasing attention in the literature, be it in the form of mergers, collaborative arrangements between departments, or total partnerships. Sergienko (2001) mentions three basic forms of co-operative relationships between firms that are currently found in the developed market

economy, namely, 1) relationship that involves a condition of various forms of joint ownership of assets, 2) a system of relationships structured on contract agreements, and 3) informal co-operative agreements. Using Sergienko's thesis, a strategic alliance can therefore be classified under one or a mixture of these three basic forms.

If one has to define strategic alliances in the context of supply chain management, then a simple working definition could be crafted as follows. A strategic alliance is a formal, long-term relationship between two or more firms in the supply chain, where all, some or none of the firms maybe domiciled in different locations. The alliance relationship involves linking some aspect of the firm's business toward a common end. This would then necessitate the sharing of relevant and material information, the risks and rewards of the relationship. The motivation toward strategic alliances has to be attributed to globalization and the correspondent need to reduce time to market.

Today, the fast emergence of strategic alliances between supply chain software providers, consulting organizations and logistics integrators, or among all of these, seems to signal a growing co-dependence and existence in the supply chain arena. Though the term may sound like military warfare terminology, a strategic alliance in this context is simply a partnership in which two or more organizations team up to deliver their strongest assets to a certain market or geographic area, thereby ensuring logistical and commercial success. This approach makes smart business sense. Software firms are already bonding with consulting organizations because they regard them as a strong influence in the customer's decisions to purchase and implement software. For the software provider, these alliances increase their chances of gaining some business, without physically having to move into another firm's space.

In order for both parties to remain committed to this form of relationship, however, mutual benefits must exist (Ellram, 1992; Stevenson, 1999). Such studies of successful partnerships have also noted certain key recurring characteristics such as free exchange of information (e.g., sharing cost and demand data) and coordinated decision making to reduce the inefficiencies inherent in less collaborative relationships (Corbett et al. 1999; Whipple and Frankel, 2000). Mutual trust is crucial to reassure firms that information shared with a partner will not be used against them.

Also, it is usual to expect firms that are attempting to establish supply chains in emerging markets or developing economies to foster such developments by forging strategic alliances with either local partner companies or integrated logistics solution providers. However, the literature has reported that firms with such strategic alliances also face numerous logistics (and other) barriers (see for example, Ellram, 1992; Pearson, 1998). Pearson (1998), in a study on such firms in China notably the smaller ones, further mentions that some of these firms have constructed strategic actions to overcome specific barriers such as communication, unfamiliarity with local business practices, and bureaucracy.

For SMEs, the urgency for them to form alliances is perhaps greater as they lack market size, firm size, financial muscle, infrastructure capabilities, and experience in cross border facilitation of trade and logistics. As such, SMEs require stronger strategic alliances to compete effectively in the global marketplace (Welch, 1992). Some attempts at addressing this problem have already been reported in the literature, e.g. for small manufacturing organizations in Eastern Europe (Mezgar and Kovacs, 1999). The next section will attempt to identify the characteristics of such environmental barriers with respect to the SMEs.

## **TYPES AND CHARACTERISTICS OF ENVIRONMENTAL BARRIERS**

Undoubtedly, doing business overseas brings an entirely new set of obstacles for logistics and supply chain management. Traditional issues like language barriers, tariffs, diverse currencies, and customs regulations all have to be overcome before a successful international SCM strategy can be introduced. As a result of these problems, many small companies have yet to move their supply chains and businesses beyond their native shores. According to Forrester Research, only about 15 percent of U.S. companies conducting business online can fill international orders, and most of those are shipping to just a few countries in Europe and Asia (Shewmake and Sapp, 2000).

Based on Halhead (1995), there appears to be two main barriers to reshaping the logistics chain, namely, internal or external barriers. Internal barriers focus on operational inefficiency or poor utilization or understanding of the organizational mechanics. Within organizations, different functions or departments often have disparate or incompatible systems and agendas, creating a technical barrier to progress. Externally, supply chains with customers and suppliers are not homogeneous. Participants often have different communication infrastructures, with language, currency and cultural barriers and legislative differences. We now delve into some of these external barriers.

### **Regional Differences**

Each of the four major world regions is at a different level of internal and external capabilities relative to logistics (Barbalho et al., 1998). Western Europe has the longest history of managing logistics across national boundaries, as well as an infrastructure for intra-regional goods movement and management. This is evident in the amount of intra-European trade that exists today. The Economist reports that Intra-European trade accounts for 35 percent, intra-American trade accounts for 11 percent, and intra-Asian trade accounts for 14 percent. Other significant lanes are the North America-Asia lane, accounting for 11 percent; Asia-Western Europe lane, accounting for 8 percent; and North America-Western Europe lane, accounting for 6 percent. North America more recently has developed intra-regional capabilities due to the expansion of U.S.-based trade to Canada and Mexico. Currently, the Asia Pacific and Latin America lag Europe and North America in logistics capabilities.

Clearly, the different rates of trade, economic and logistics development for each region affect the facilitation of physical inventory and information transfer in the supply chain. Within the Asia Pacific, this disparity is even more stark as the various economies in this region are not developing in tandem themselves. As a result, efficient supply chain management and operations by SMEs for higher productivity will remain a key challenge.

### **Political Instability**

With supply chains that extend into Asia and other emerging markets, there is also substantial political (and often leading to currency) instability that can affect product cost or disrupt supply of critical raw materials, components and finished goods into other parts of the world. This is a strong barrier particularly for supply chains and products that suffer from long lead times and short product life cycles. An example is that of the toy industry. Johnson (2001) argues that such instability creates risk for suppliers in the chain as it can cause severe and unpredictable supply disruptions. Toy makers in Indonesia can attest to this.

### **Currency Instability**

The late 1990s have taught managers about the benefits and risks of global supply chains, even regional ones. While enjoying the benefits of global markets and cheap manufacturing in less-developed countries, many companies were lulled into a false sense of global euphoria. No one would have imagined that the environment could change overnight. For those operating in Asia, the summer of 1997 was one, few will forget. The ensuing financial crisis led to plunging currencies and stock markets turned the fast-growing Asian economies on their ears so quickly that most companies were caught by surprise. By the end of the 1997, many of the East Asian currencies had been sharply devalued. For toy makers operating in Asia, the financial crisis dramatically changed the cost structure of their labor-intensive products. While cheaper labor might appear good, some toy makers found their supply chain partners failing and unable to pay debts for materials and equipment accumulated in now more expensive currencies. No doubt, many of the debt laden supply chain partners are indigenous SMEs, wedged uncomfortably in a struggling market.

### **Restrictive Laws and Regulations**

From a supply chain management perspective, it is vital to understand the impact of government regulations on players in the supply chain. Restrictive laws and regulations can create artificial resource scarcity. The impact of government intervention on resource scarcity is a concern for buyers and suppliers. Rumelt (1987) has described two main types of regulatory mechanisms: (1) exclusive property rights granted by the state, or by another actor, under the authority of the state, and (2) various forms of first-mover advantage. In this way, through its ability to grant and to regulate property rights, the state can clearly play a central role in creating and sustaining situations of resource scarcity. This scarcity may confer, in turn, an unfair, sub-optimal power advantage on a buyer or a supplier. Such creative or disruptive regulations can either help or break an otherwise efficient supply chain respectively. SMEs that are in a cash strapped situation and without the deep pockets of the MNCs cannot afford to be trapped in this bear hug.

Related to the rules and legal framework found in many countries today is the evidence of sometimes altogether unnecessary customs delays. As materials and goods traverse from one country to another, borders are inevitably crossed, and any item shipped becomes subject to customs authorities control. The trade literature reports that customs delays can be a bane to efficient physical flow of goods and for many practicing logistics professionals, customs clearance is unavoidable. Under today's legal environment, moving goods either globally or regionally would implicitly mean having to impede the velocity of goods flow, and exacerbate the extent of documentation handling, to the detriment of fast time to market.

### **Other External Barriers**

Other external barriers, related to a country's economic and infrastructural maturity include:

1. lack of coordination between different transportation and logistics authorities such as railways, communications, civil aviation, trade, and port authorities. This often leads to excessive (and burdensome) documentation, poor connectivity between nodes and prolonged transit times in the logistics pipeline. As a result, firms have to bear with longer order cycles, unproductive activities and unwarranted increase in operating costs. SMEs definitely cannot afford this.

2. Backward logistics infrastructure of country or region. A supply chain is only as strong as the weakest link in that chain. The quality of the supply chain in turn is predicated by the state of development of the logistics infrastructure, be it hardware (technology, systems, facilities) or software (manpower, knowledge). The absence of either type of infrastructure can lead to low handling capacity, slow responsiveness, less flexibility and decreased productivity. SMEs in developing economies are, as a result, unable to move beyond their traditional locale and supply lines.

In sum, to the SMEs, external barriers can be even more restrictive. While being small allows companies to be flexible and nimble, there are also disadvantages when compared to the larger firms. Increasingly, SMEs will find that they need a certain minimum size to better serve their global customers and compete effectively with other international players. Their barrier to entry in the context of a global or even a regional supply chain lies in the fact that they simply lack economies of scale and critical mass, be it in production or market reach.

### **Internal Barriers**

Despite the belief that a click and mortar model is the holy grail sought out by SMEs wishing to outlast this millennium and be in the same league as the big boys of business, limited resources and the lack of integration expertise with back end systems are undermining the SME's endeavor to be a major supply chain player.

Indeed, the lack of resources internally is stifling the effort of many SMEs in truly integrating their supply chain. As an example, consider the case of the SMEs in the retail trade (Chan, 2001). SMEs in this trade realize the need to tweak their business through better use of technology. While many MNCs in the industry have moved to linking customer relationship management with SCM, few SMEs can afford this luxury. At the moment, very few SMEs in this industry are performing in-depth analyses of their customer information or transaction data even though they have a reasonable customer base of 10,000 (many acquired through the web). One fundamental reason lies with cost. Few SMEs ill afford neither the price of superior data mining software nor the expertise to make judicious of such software. Further, they cannot afford the manpower to sift the mountains of data collected.

Cost and the lack of expertise have often been cited, as two major obstacles that deter the SMEs from adopting needed technology for efficient SCM implementation in the Asia Pacific. While SMEs recognize that there are suitable and reputable software vendors who can help the SMEs to implement appropriate SCM solutions to increase revenue, rationalize costs and therefore enhance survival and competitiveness, however such commercial technology solutions do not come cheap. If anything, these platforms are usually out of the financial affordability of the small firms. For instance, a good IT business solution for the supply chain can vary from USD 12,853 to over USD 128,534, depending on the scale, hardware processors, and the nature of the business (Chan, 2001). This investment value is much greater than the USD 10,000 that half of the SMEs surveyed in Hong Kong are prepared to pay (Asian Business, 2001, p.25). Buying such a system is only the beginning of the SME's woes. Maintenance and system customization costs are really the destroyers of potential adopters of such technology. Indeed, the latter set of costs can be so prohibitive that smaller firms would have encountered great difficulty in staying on-line. Turning to another example, in the case of the popular SAP implementation, the cost of hiring an SAP e-business technical consultant to conduct on-site configuration of maintenance can be as high as USD 1,000 a day. This quantum is



considered high for a mid-sized company (Chan, 2001).

Inertia to change is another barrier hindering SMEs from streamlining their supply for greater productivity. A recent survey established that about 14 percent of Singapore based SMEs had proactively implemented organizational changes in anticipation of future difficulties, threats and opportunities (Menkhoff, 2001).

### **SOME PRACTICAL MEASURES TO REDUCE BARRIERS**

We will now elaborate on some generic measures, which can be adopted and collectively managed by the public sector, industry and enterprises to lessen the impact of such barriers to superior supply chain management.

#### **Reduce Regional Differences by Re-aligning Logistics Operations**

One way some firms have attempted to overcome the different trade flow rates and logistics capabilities of the four main trading regions is to deliberately dislocate their supply chains to allow for a greater dispersion of the logistics network in a particular region. Such strategic dislocation points can be in the form of distribution centers or hubs. Another way is to outsource the supply chain operations to local logistics service providers who have the domain knowledge and expertise. Political initiatives in liberalizing trade and finance, coupled with technological innovations in information, communication and transport technology, have also stimulated the ongoing process of globalization, indirectly negating the regional differences. SMEs should therefore actively seek and work closely with logistics service providers who are willing to help SMEs manage their logistics operations. On another note, the SMEs can choose to play a greater role with the regional logistics providers in servicing the MNCs.

#### **Reduce Currency and Political Risk through Operational Hedging**

One approach some progressive firms have aggressively adopted to overcome or mitigate the concern over political (and hence currency) instability is to impose a strict discipline of working within a range of coordinated outsourcing strategies; and constantly hedging against political and currency risk by producing in different countries. No doubt, rapid changes in financial markets present both arbitraging opportunities and cash flow crises. To exploit a currency change or to avoid the latent risks of operating in volatile economies, smart manufacturers tend to operate and source (sometimes from the same suppliers) in several countries. By diverting the origin of their products, exposure to sudden changes is abated. Also, such manufacturers usually require their suppliers to provide upside production or supply flexibility. Indeed, it is usual for established brands like Nike and Mattel to have facilities in the US, Mexico, China, Malaysia, Indonesia, Thailand, and India. When political volatility slows production in one country, volume can be moved to another. Thus, building a strong, flexible web of internal and external sources can hedge against the impact of currency and political barriers, and effectively mitigate supply risk. SMEs need to form and leverage on such networks for the longer good of their success, and reduce the dire effects of demand fluctuations on their production lines.

#### **Balance Laws and Regulations Judiciously**

Obviously, government regulation is a double-edged sword. It can either create or sustain a firm's exchange power advantage, or it can be used to constrain or remove such an advantage (Sanderson, 2001). When a government chooses to intervene, it must always

adopt a careful balancing act. It must assess the costs to general consumer welfare of creative regulation on behalf of a particular firm(s). Also, it must evaluate the impact on innovation, growth, and employment of disruptive regulations to constrain or remove an exchange power advantage. Public sector agencies must then liaise with businesses and logistics service providers to cut a fine line between the two forms of regulations, to minimize disruption to the supply chain. This is particularly true for those SMEs that have products or services, which need to achieve farther market reach.

### **Invest in Global Information Infrastructure**

In addition, software solution providers active in the supply chain management space have developed a user friendly, web-based supply chain management service for the entire chain from purchase order to final delivery, including the export process and landed costs updating. The e-supply chain is clearly the trend and this global (due to the Internet) supply chain execution infrastructure can link everyone in the process i.e. buyers, carriers, customs brokers, and financial providers (Sowinski, 2000). Through this, international barriers are conquered in cyberspace. SMEs should join in the respective industry portal and be cyber-connected as quickly as possible in this space.

### **SMEs Consortia to Abate Effects of Barriers**

Greater economies of scale can be achieved and the bottom-line significantly improved if SMEs can be clustered together as a mega economic grouping to rationalize their operations and achieve transportation scale economies, and lower overheads arising from resource pooling. Competitive risk aside, the thesis here is that schools of small fish when grouped together can provide sufficient (and even critical) mass to engage MNCs and logistics solutions providers in a regional supply chain.

## **STRATEGIES EMPLOYED BY SINGAPORE TO OVERCOME BARRIERS**

We now attempt to highlight how Singapore has, using a strategic interventionist approach through relevant public sector agencies, effectively embarked on assisting local SMEs to provide an environment conducive to the seamless flow of inventory, information and fast cash cycle times. Some of the proactive steps taken so far are provided below.

### **Supportive Government Policies**

#### **(a) *Free Trade Culture***

Singapore's free trade policy has been the cornerstone of its flourishing entrepot trade. Virtually all imports are duty-free. This result is credited to the tireless effort of policy makers who ensure that the right pro-business policies are in place for MNCs and SMEs. Foreign investors are not required to enter into joint ventures or cede management control to local interests. The government generally does not restrict nor discourage foreign investment either to protect local industries or for any other reason. In addition, Singapore's strategy in addressing competitive challenges from the external environment is to increase productivity, upgrade labor skills, improve infrastructure capabilities, and to offer a wide array of incentives to attract higher value-added industries providing leading-edge technologies. This is consistent with Rumelt's (1987) creative regulation. Such efforts have realized favorable outcomes, namely, in creating employment and other allied service industries like logistics and supply chain services.

(b) ***Transparent Investment Stand and Political Stability***

Investment policies are transparent and the government is viewed as clean, non-oppressive, and corruption free. It is one of the world's most open investment regimes, making the environment for business conducive (Table 1). Again, the government's philosophy is to maintain political stability for investors (the MNCs) and traders (promising local SMEs). This mindset is embodied in the government's dedication to free-market principles, and to maintaining a first-rate labor force and infrastructure to assist local players to join the global bandwagon.

**Table 1: Business Environment in Asia Pacific**

	<b>Regional Ranking 1995-1999</b>	<b>Regional Ranking 2000-2004</b>
Singapore	1	1
Hong Kong	2	2
Australia	4	3
Taiwan	5	4
New Zealand	3	5

*Source: EIU May 2000.*

(c) ***Government Incentive Schemes***

These schemes mainly comprise a variety of tax concessions and assistance plans to encourage investment. Concessions such as the Expansion Incentive, Export of Service and Local Enterprise Financial Assistance schemes are often given to qualifying companies using Singapore as a logistics hub and for local enterprises to springboard into the region.

**Trade Facilitation**

Singapore has no real non-tariff barriers to trade. The country's role as a regional commercial hub is underscored by the fact that 40 percent of Singapore's total imports are re-exported. According to the TDB, 90 percent of sea cargo (containerized and conventional) can be cleared by customs within 8 minutes while the same percentage of air cargo can be cleared within 14 minutes.

Another instrument used to digitize the paperwork that underpins the trade and logistics process is the TradeNet system. TradeNet allows companies to exchange business documents with government agencies, and local and overseas trading partners. Under TradeNet, a shipper or 3PL can submit electronic trade declarations to the TDB, Customs and Excise Department and various other controlling authorities for processing and approval. Approved documents are then sent electronically to the company's computer for printing, usually within minutes, instead of the traditional hours and days. This effectively reduces cost and turnaround time for the preparation, transmission and processing of trade and customs declaration from port to dock. Today, over 2,600 TradeNet subscribers and more than half a million declarations are processed through the system each month. TradeNet.com, the Internet version, was established in 1998. Under this enhanced version, costs for users are further reduced. Already, registration fees have dropped to just S\$50 instead of S\$850 and the need for new users to install specialized software is removed.

The latest TradeNet Plus will be implemented by the end of 2001 to facilitate faster information flow through the entire trading chain, from product sourcing to delivery, further boosting logistics efficiency. The linkage between inventory and information flow is further enhanced through a number of schemes geared towards e-supply chain management. TradeNet Plus is expected to generate S\$2.8 billion savings to the trading

community. One feature of this enhancement is the Trade Finance System, which allows shippers (SMEs) to submit online applications to participating banks for trade financing such as letters of credit, demand drafts and telegraphic transfers. It shortens the financial or cash to cycle time of the overall supply chain considerably.

### **Quality Infrastructure**

Singapore's seaport, airport and telecommunication infrastructure have attracted a large pool of MNCs and local companies. Supporting this hardware is a pool of qualified logistics professionals trained in specialized degrees or diplomas in logistics from universities and polytechnics, locally and abroad.

The emphasis on good infrastructure, knowledge or otherwise, appears to be a regular in the nation's development and upgrading plans. Singapore has a highly pro-business and modern infrastructure that rivals developed nations. The city-state also enjoys reliable and sophisticated networks for IT, telecommunications services, transportation and utilities. Singapore is ranked fourth (after the U.S., Sweden and Finland) as the most information-driven economy (Table 2). Net savvyness serves as a good leading indicator of e-distribution capabilities. Singapore's IT and telecommunications infrastructure is mature, with the phone-line penetration rate on par with developed nations. To fuel the growth of information industries, Singapore has installed Singapore ONE, a nationwide high-speed fiber optic broadband network that provides multimedia applications and Internet services.

### **Good Connectivity of Transport Modes**

Singapore offers strong connectivity to the Asia-Pacific, being a vibrant international maritime center (currently ranked as the 11<sup>th</sup> most important maritime nation by UNCTAD). She is linked to more than 740 ports in 130 countries worldwide and acts as the focal point for over 400 shipping lines. When fully developed, Singapore's newest and most advanced Pasir Panjang Terminal can able to handle 36 million TEUs a year. Singapore's air linkages are equally extensive, with 3,200 weekly scheduled flights served by 64 international airlines to 151 cities in 50 countries. Table 3 shows the extent of this connectivity.

**Table 2: World's Most Net Savvy Nation**

	<b>Internet Index Rank</b>		<b>Overall Information Society Ranking</b>	
	<b>1998</b>	<b>1999</b>	<b>1998</b>	<b>1999</b>
Singapore	16	1	10	4
Australia	9	2	11	8
US	3	3	1	1
New Zealand	8	4	14	13
Sweden	2	5	2	2

*Source: Information Data Corp Information Society Index 2000.*

**Table 3: Air-sea Transport Connectivity to the World's Top 8 Regions**

Region	Seaports	Daily Sailings	Airports	Weekly flights
Southeast and South Asia	44	22	31	1,953*
Northeast Asia	29	9	17	893
West Asia	16	3	8	115 <sup>#</sup>
Australia	19	1	22	415 <sup>@</sup>
Africa	19	2	7	45
Europe (less Mediterranean)	24	5	31	421 <sup>^</sup>
North America	22	3	18	212 <sup>+</sup>
Central/South America	15	1	10	
Total	188	46	144	4,054

Sources: *Singapore Transport and Logistics, Jan 2000, p. 11; CAAS and PSA Corp.*

\* incl. India; # incl. UAE

@ this covers Oceania, which includes Australia and NZ.

<sup>^</sup> incl. Mediterranean; + incl. North, Central and South America

## KEY AGENCIES INVOLVED IN RE-SHAPING EXTERNAL ENVIRONMENT

In describing the strategies for overcoming the barriers to SCM development for Singapore based firms, the effort of the public sector agencies has to be acknowledged. Without their active involvement, much of the accelerated growth and maturity of the logistics industry would still be a moot point. We now briefly mention the roles and functions of the TDB and PSB, as these are the lead agencies directly involved in growing local SMEs and their current supply chains.

### Role and Functions of TDB

The TDB is the national trade promotion agency to help the private sector promote and facilitate trade. One of the major thrusts of the Trade21 blueprint is to make Singapore the global center for trade hub services, including logistics. To achieve this objective, the TDB has adopted a three-pronged approach, namely,

- (i) Administering tax incentives and programs to persuade MNCs to set up RHQs locally;
- (ii) Providing local businesses with timely market intelligence and project development support; and
- (iii) Ensuring efficient trade support services through TradeNet.

The TDB plays a pivotal role in helping to position Singapore as a total logistics hub, with leading edge capabilities in terminal facilities and logistics management competency. In this regard, the TDB has identified, as part of the Logistics Masterplan, six key thrusts to advance the logistics industry in the new millennium (TDB Press Release, 1999). The strategies to drive this set of thrusts are as follows:

1. Develop an integrated and globally connected infrastructure.
2. Develop a conducive IT based environment and competent IT capabilities.
3. Enhance integrated logistics operations.
4. Attract international global hub activities and solutions based services and internationalize the local logistics industry.

5. Develop world-class expertise and skills.
6. Enhance market access to facilitate expansion of international networks.

Apart from formulating relevant logistics and trade policies, the TDB is also active in creating greater market access through organizing logistics missions to key and emerging markets to enhance the global reach of local logistics firms and better understand the host environment. For the smaller firms that risk being marginalized by mega mergers and alliances, the TDB is currently working on how to band these companies together into sufficiently large consortia to help them regionalize.

The TDB is also working closely with the Manpower Ministry to formulate a Logistics Manpower Roadmap to develop requisite manpower capabilities, particularly those of the professionals and managers. One scheme is the Certified Practicing Logistician (CPL). Launched in March 2000, this scheme recognizes and qualifies professional logisticians, and improves the technical, managerial and logistics-specific competencies of the middle managers and specialists. In this effort to professionalise the logistics industry, the TDB is coordinating with industry associations and other relevant education and training institutions to develop the CPL program. It is part of an overall plan to develop a critical mass of logisticians to propel the industry towards e-logistics (TDB Press Release, 2000b).

### **Role and Functions of PSB**

The PSB works closely with the other agencies to enhance local SMEs' competitiveness and economic growth. In this regard, the PSB works with the industry associations to help develop industry wide applications aimed at transforming business and help SMEs form economic groupings for better synergy and economies of scale. Managing more than 60 development assistance programs and 56 economic groupings in 33 trades, this agency is critical in helping SMEs overcome various internal and external barriers.

As noted earlier, SMEs being small in size and reach (usually) would require more financial assistance. In this regard, the PSB has been very proactive and forthcoming in providing financial assistance (through LETAS and LEFS<sup>1</sup>) to the 96,000 or so SMEs based in Singapore. To date, some 360 LEFS applications and S\$127 million worth of LEFS loans have been awarded. The PSB under the strategic SME21 Plan have been more active during the current recession to help SMEs reinvent themselves. In all, according to latest report from Singapore Enterprise, a total of SGD 200 million has been set aside under a credit guarantee program to help SMEs (Singapore Enterprise, Jan 2001, p. 1). About 500 SMEs are expected to benefit from this program.

As for SCM performance and networking, the PSB launched the BusinessConnect Program in 1997 to enable SMEs to seek new business opportunities outside of Singapore and to explore the feasibility of business alliances with foreign partners. Under the program, business-matching events are organized either in Singapore or in Singapore's major export markets. At these events, participating local and foreign enterprises hold pre-arranged meetings on the basis of their business interests and objectives. Overall, the BusinessConnect program has facilitated about 4,000 business meetings for some 5,800 companies. Complementing this program is SingaporeConnect, a global business matching

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<sup>1</sup> *The Local Enterprise Finance Scheme (LEFS) assists SMEs to establish a viable new business, automate plant and equipment, expand manufacturing capacity, diversify into other product lines, and upgrade their operations.*

service on the Internet. SingaporeConnect has attracted an average of 120 business collaboration interests posted each week and the website has been accessed more than eight million times.

Another program launched in 1997 is the National Cost of Quality (NCOQ) program. The aim is to help SMEs set up cost management systems to increase their cost competitiveness and enhance profits. With a cost of quality system in place, the SME is able to determine the extent of its actual and potential quality problems, quantify visible and hidden costs, and identify and priorities areas for optimal SCM improvement. In short, a COQ system helps SMEs to minimize costs by eliminating internal inefficiencies, reducing wastage, saving energy, recycling materials and improving logistics processes. Such tangible results lead to productivity gains, superior performance and greater profitability. Since then, more than 500 SMEs have embarked on the NCOQ program. PSB has reported that the first 80 SMEs who completed the program have realized annual cost savings of S\$23 million, or on average about S\$288,000 per participating SME. Through this program, SMEs can enhance their inventory management control, improve on order picking efficiency and purchase planning systems. In short, the result is a leaner supply chain.

On the aspect of pooling of resources, the PSB has also instituted the Business Fusion Program. The objective is to help SMEs of related industries or in the same value chain to come together to exchange information, share resources and enhance mutual co-operation. SMEs under this program can thus better compete by leveraging on each other's resources and expertise. By pulling resources together, they are now in a stronger position to venture into new markets and overcome cross border impediments. Since the launch of the program in 2000, more than 200 SMEs have registered with the PSB. Of these, 97 have formed 30 fusion groups in industries such as automotive services and repairs, industrial tool calibration, logistics, construction, silkscreen printing, medical instrumentation and transportation.

The PSB has also been encouraging local SMEs to leverage on Internet technology to sharpen their competitive edge. Under the SME 21 Plan launched in January 2000, one of the goals is to increase the number of SMEs using e-commerce to 32,000 by 2003 so that at least one in three SMEs is connected to the world economy. To achieve this goal, the PSB has drawn up an e-commerce adoption action plan to encourage SMEs to jumpstart their online capabilities by using ready-made eCommerce packages offered by e-commerce service providers, especially that of electronic transactions. The PSB recognize that electronic transaction of financial flows is a critical part of the supply chain and is viewed as being essential to good SCM. The focus of the Jumpstart program is on streamlining internal processes for better online transactions to match that of the MNCs. The Jumpstart thus recognizes the need for SMEs to seize new levels of efficiency through the digital economy and ride on the new Internet wave to bring their supply chains to new heights. Currently, about 17,000 SMEs are involved. The PSB is working closely with the industry and key portal operators to customize applications to suit the needs of SMEs in different trades to build sizable online trading communities for e-commerce services such as B2B, B2C portals or application service providers. A PSB survey found that almost 50 percent of the SMEs with e-commerce capabilities have made some online transactions, and close to 60 percent of the SMEs accept that the Internet can enhance their business efficiency and growth. As they embrace e-commerce in their business operations, these SMEs will transform into vibrant and resilient enterprises that can compete effectively in the region.

We now provide an example of a recent e-portal set up by an SME in the lowest

value part of the value chain (Singapore Enterprise Jan 2001, p. 6). This is the coffeshop trade, a traditional low technology sector of the economy. There are about 2,000 coffeshops in Singapore and the number is expected to increase given the popularity of such places with the local populace. However, the efficiency of these enterprises is low as three in four of these shops are operated by the individual proprietors, with rest owned by the coffee shops chains. Early in January 2001, kafe123.com was launched as a B2B portal serving the entire supply chain for the coffee shop trade. It is also the first such portal in Singapore for the food and beverage industry. The portal was developed by TX123 Pte Ltd and STE International Pte Ltd, with support from the PSB. This portal enables all trading parties, from coffee shop retailers to distributors, dealers and manufacturers to transact business online. Examples of transactions include sales orders, inventory control, stock replenishment and so on through the Internet. As a result of the round the clock operations in ordering availability, the traditional paper work involved in ordering is expected to reduce by 30 percent and inventory management improve by 50 percent. In this way, efficiency (in terms of time and money) for buyers and sellers in the supply chain is achieved. At the moment, the preliminary results are positive. The larger local players in this trade are also embellishing the kafe123.com portal. These players include Kosma, Aik Hua, Kim San Leng and some of their suppliers. The users of such portals are usually charged a subscription fee and consultancy fees (which is subsidized up to 70 percent by the government) for process redesign and streamlining of their processes, system familiarization and integration. By the end or 2001, it is expected that at least 500 coffee shops (35 percent) will be engaged in this portal to raise their productivity.

### **CONCLUDING REMARKS**

In view of globalization and the impending one marketplace, good supply chain management is here to stay. SMEs need to increase connectivity to suppliers, customers and supply chain partners in the shortest possible time. However, before any enterprise can realize the benefits of improved logistics or commercial success, the barriers, internal and external, must be either overcome or mitigated. External barriers particularly relevant to SMEs such as IT and business infrastructure, unenlightened trading environment, low skills level of the workforce, weak political and economic policies, and inefficient trade facilitation systems must be tackled and managed positively by the relevant agencies working closely with the movers and recipients of logistics. Indeed, technology must be embraced to increase the speed and reach to customers, thereby remaining competitive in the supply chain network economy. Only then, can the SMEs achieve an operating capability within a sophisticated infrastructure that includes excellent free trade zone facilities, ports providing speedy goods transfer or handling for redistribution, efficient warehouses and excellent telecommunications for enlightened supply chain management. To remove the barriers, a tripartite collective effort is required of the public agencies, industry bodies and the enterprises themselves.

Public sector help through the provision of adequate physical and virtual infrastructure is required in order to provide the necessary conduit for moving the SMEs effectively along the global or regional supply chain. This paper has highlighted the example of Singapore's attempt to do so. Government and her related instruments must play an active role in fostering such conducive environments, engage in confidence building, and remove arcane bureaucracy.



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## **Brief Background of Fiji**

Fiji is located in the South Pacific Ocean, approximately 3,100km (1,900 miles) from Sydney, Australia and 5,000km (3,100 miles) from Honolulu, Hawaii. Fiji was a British colony until 1970 when it received independence. After the military coup in 1987, Fiji became a Republic Island nation. Following the civilian coup in May 2000, Fiji is currently excluded from the Commonwealth.

Fiji consists of more than 800 islands, about a hundred of which are inhabited. The total land area is about 18,270 sq. km (7,050 sq. miles). The climate in Fiji is tropical with average temperature of 25 degrees Centigrade. The islands are susceptible to tropical cyclones between the hotter months of November to April. The country's natural resources are limited to hardwood trees, plentiful marine life and small deposits of gold, copper and silver.

Fiji's population is just over 750,000. Approximately 60 percent of the people live in the rural areas; however, the rural-urban drift is of concern during these times when job opportunities/choices are low and urban development is near its peak. The population is ethnically and culturally mixed. The indigenous Fijians make up 50 percent; Indians (brought in by the British to grow sugar cane) represent 44 percent. The others are Chinese, Europeans, Pacific Islanders and mixed races. The official language is English.

It is essential that there is some discussion on the economy of Fiji, as it is against this backdrop that the SMEs have been and are established. The country's economy suffered severely after the coup in 2000 with economic growth plummeting to negative 2.8 percent in 2000 after a growth of 8 percent on 1999. The forecast growth for 2001 is 1 percent. Job losses and pay cuts have weakened consumer demand and slowed down investments. The major contributors to GDP are from the sugar, tourism, garment, gold and fishing sectors. The tourism sector suffered immediate effects of the coup as visitor numbers dropped sharply. Fiji continues to promote itself as a tourist destination. Full recovery is expected to take much longer as the choice of tourist destinations is plentiful. The sugar industry, which has the biggest flow-on effect through the economy, is currently benefiting from the preferential trade agreements. The benefit will gradually phase out by 2007 as the World Trade Organization (WTO) regulations take over. This sector is in the process of major reforms to ensure its competitiveness under WTO regulations. The garment sector, which thrived after the Government introduced incentive packages in the late 1980's, has suffered setbacks due to the political upheaval, with some closing their factories.

Trade sanctions slowed down outputs after the coup in May 2000; however, some trade links have been restored after the national elections in 2001. Trading partners are still cautious. However, aid assistance has resumed. The review of the Constitution was one of the subjects in the elected government's party manifesto. This will need to be attended to by the Government in the near future.

Skilled and professional labor force continues to emigrate. Majority emigrating are Indo Fijians. All sectors of the economy are experiencing high turnover as a result. Inflation is expected to be around 3 percent by the end of this year. The Government has put in place incentives to spur investment and growth in the economy. These will be

discussed later.

Fiji's land is largely (85 percent) owned by the Native village clans. All such land are titled as Native leases. The Native Leases are administered by the Native Land Trust Board. The Agricultural Landlord and Tenant Act (ALTA) governs all agricultural Native leases. Problems associated with leased land came to the forefront when most of the existing ALTA leases started expiring in the last couple of years, and renewals became difficult as some of the landowners chose not to renew the leases. More leases will expire in the next few years. Many farmers (mostly sugar cane) have been displaced from land they have farmed and invested in for decades. Those whose leases have yet to expire or will expire in the next few years have slowed down their investment in the land. The sugar industry is therefore also negatively influenced by the decline in input and investment by the farmers. The expiring ALTA leases and the review of the constitution are key issues that will affect the level of future investments. The new Government has the challenging task of resolving the issues amicably so that both local and overseas investment levels can reach the desired level of 20 to 25 percent of GDP. Investment data show a decline in the number of projects implemented from 91 in 1998 to 68 in 2000. The Government has made a commitment to resolve the land issues by mid 2002.

Fiji's economy will have further setbacks through the aftermath of the September 2001 incidents in the USA. As global demand decreases, especially of Fiji's trading partner countries, exports will suffer. The tourism and garment industries are highly susceptible. The country has seen closure of several garment factories in recent months.

## **INTRODUCTION**

The existence of micro/small scale enterprises in Fiji has long been unrecorded. The majority operated as backyard/cottage industries with little or no help from the formal banking sector due to the lack of security and risky nature of project. Banks would like to see a proven track record, and adequate equity contribution to support the commitment of the client. The types of activities or projects were simple in nature, which used easily available raw materials. Manufacturing of local handicrafts, which do not require machines, running food/preservative canteens, operating a tailoring business, are some of the common activities mostly operated by women. The identification and assistance through NGO's brought to the forefront the importance of the sector and the need to nurture and assist them through training and financial assistance. Some discussion on this sector is important as some of the medium and large businesses in the country progressively grew from such small levels.

At the national level, the Government has recently taken a stand towards developing the small/micro enterprise sector. In February 2001, the Cabinet approved the setting up of the Small and Micro-Enterprise Development (SMED) center. The SMED center has identified target groups including school leavers, women, redundant workers, ex-prisoners, disabled people, farmers, fishermen and fisherwomen. The center will operate as a focal point for all service providers. It will identify and offer training facilities to this sector for better chances of success and expansion. It recognized that this sector should not be burdened with regulations, but a more conducive environment is developed to reduce the constraints associated with starting small business ventures.

The SMED center will work closely with the Fiji National Training Council to develop the SME training policy and conduct training. Accessing finance for this sector is essential. The Fiji National Provident Fund and the Fiji Development Bank assistance will

be sourced in support of the small business development. The identification of market outlet for small operators has been considered. The SMED center will encourage strong links between small and larger businesses for market outlets; thus, a supply chain management or various forms of alliance can develop between the two levels of operators. A small enterprise “culture” is what the SMED hopes to develop, giving it a respectable socio-economic status that will attract young budding entrepreneurs to join.

The following important issues will be addressed to offer the most conducive environment for the SMEs to start and grow.

### **Markets**

There is a need to determine the difficulties experienced in marketing the output of the SMEs. Such small-scale operators are unlikely to have the marketing skills, as they would be more concerned about production. The National center sees this as an important role for itself. It will work closely with larger enterprises to identify additional market outlets, including sub-contracting arrangements, for the SMEs. It will also conduct a feasibility study on setting up a central organization to buy and distribute SME products.

### **Training**

An SME training policy will be developed to cater for the special needs of this sector. An appropriate curriculum will be introduced at high schools to identify and foster future entrepreneurs. Employers will be encouraged to take on students on work attachments during school breaks. The tertiary institutions will increase their training coverage in the SME sector. A supportive relationship will need to be developed between the school, the community, the tertiary institutions, the employers, etc., to provide the best possible environment for SMEs to grow.

### **Finance**

Due to the risky nature and lack of securities by the SMEs, finance from the formal banking sector is almost inaccessible. Some organizations have been identified to assist in this area, namely the Fiji Development Bank (FDB), credit unions, cooperatives and other government operated schemes.

### **Appropriate Technology and other Support**

Related support in terms of continued development of relevant technologies will be required from which the SMEs can source technical knowledge has been considered. Keeping a database of statistics on the SMEs is essential. From this, the measures of success/failures can be monitored and addressed. The special needs and infrastructure requirements can be known. The Cabinet paper acknowledges the importance of learning more about the SMEs.

## **DEFINING SMEs IN FIJI**

Defining this sector has been very difficult because no data is available on such enterprises. Recently with more attention focused in this sector, some definitions have emerged. The key criteria used to define this sector are the number of employees, annual turnover and amount of investment. In the Fiji context, a micro enterprise is defined as having 5 or less employees and having an annual turnover of less than F\$30,000. Those having annual turnover between F\$30,000 to F\$100,000 and employing 6 to 20 people are

defined as small enterprises. Those with higher employment and turnover would therefore be considered medium to large-scale enterprises, the latter being very few in number. From experience with the FDB clientele, demarcation between micro and small enterprises is unclear. Perhaps when the SMED center is operational and data is obtained, a clearer definition will emerge. The FDB's definition for small businesses is those enterprises having an annual turnover of F\$50,000 and below, within the guidelines mentioned above.

Again, from experiences drawn from the FDB's Small Business Scheme, the supply chain management relationship is virtually non-existent at this level. Purchasing and turnover is small enough for the entrepreneur to change suppliers constantly depending on price, availability, location, delivery time, etc., all bought from local middlemen. Admittedly, no earlier study has been done to assess the relationship. Subsequently, this report will focus more on the relationship of the bigger (medium to large scale) enterprises. By global standards, the size of such enterprises operating in Fiji could well be classified as SMEs. Information is based on discussions with a selection of entrepreneurs.

## **SCM RELATIONSHIPS – INTRODUCTION**

Resources within Fiji are restricted to timber, marine, gold and copper. Except for timber, other inputs are sourced outside the country. Supply chain management relationships in Fiji context can best be described as a new concept, just emerging. Alliances that have been developing are not necessarily between manufacturers and suppliers of raw materials. The marketing and distribution, technology support, contract growing within agro-processing enterprises, and some others will be discussed.

New industries in Fiji received a boost in the late 1980's when the Government introduced a list of incentives to stimulate both local and overseas investor confidence to move the economy forward. This stimulation was necessary after the country moved into recession following the military coup in 1987. Industrial estates were established in major urban centers, supported by appropriate infrastructure. Tourist resort facilities increased in number to provide for the growing number and level of service expected from the visitors. Visitor arrivals increased from 371,000 in 1998 to 410,000 in 1999. Export industries were especially encouraged. Incentives, in brief, included the following:-

- Decrease in corporate tax
- Remove withholding tax on dividends
- Introduce investment allowances and accelerated depreciation
- Carry forward losses to 6 years
- Low duty rates for production inputs, construction and capital materials
- Duty free import for exporters
- Export income tax deductible.

Suitable trade agreements, some of which had existed earlier, were revamped to facilitate increased exports and import substitution industries. The agreements are listed below:-

- *Sparteca* – Under the agreement, New Zealand provides duty free and unrestricted access to all products originating in the Forum Island Countries (FIC's). Australia also allows duty free and unrestricted entry to all FIC's products except sugar.

- *Cotonou Agreement* – This is the successor to Lome IV signed in June 2000 in Cotonou, Benin. The main objective of this Agreement is to ensure sustainable development and gradual integration of the ACP countries into the world economy. Fiji is expected to benefit from this Agreement through preferential access, mainly for sugar exports and also through other trading arrangements.
- *Free Trade Area* – Under this Agreement, Fiji and other FIC's will not charge import duties when dealing amongst themselves.

With limited resources available locally, raw materials were sourced from overseas. Fiji was set to compete internationally. Fiji's location places it at a greater disadvantage compared to its South East Asian and other competitors, which are within closer proximity to raw materials and market sources. As production costs are on average higher than its overseas competitors, Fijian exporters have been dependent on the special agreements to market their goods. Investors were attracted by the various incentives and cheaper source of labor. The garment sector especially thrived during the nineties. Garment exports increased from F\$200.1m in 1997 to F\$322.2m by 1999. Relationships and alliances that formed were largely with foreign members, buyers, etc. Towards the late nineties, the government again, in order to make the local industries globally competitive, introduced the policy of deregulation, which eliminated the smaller and inefficient manufacturers. Some key local industries still remain protected through tariff on import substitutes. Fiji's manufacturing sector continues to encounter various hurdles and challenges, as the special trade agreements will gradually phase out within the next few years. The latest civilian coup in May 2000 was another set back for the local enterprises. Global market and prices will determine future trade relations. The need to be cost effective, satisfy the global quality standards, and timely delivery of finished products are high on the agenda of entrepreneurs currently.

### **SCM and other Forms of Alliances**

It is important to note that the successful industries are all very young. A decade ago these enterprises were being established and had gone through difficult times. The alliances they have developed are also recent. In the case of Voko Industries Limited, a fish processing and canning venture, it became highly successful due to the various alliances it has formed. It is partially owned by a Korean based company, a raw material supplier who also provides technical, maintenance and equipment support to the company. The company would like to see locals trained to handle the maintenance of plant and equipment rather than total reliance on the Korean shareholder. Raw materials are also imported from New Zealand. Voko has secured a good credit rating with its suppliers and is able to take advantage of better credit terms. Previously their suppliers dealt strictly on cash basis. Packaging is sourced from local suppliers. Tariff on import substitutes has placed Voko at a further advantage. However, marketing was becoming costly as it involved traveling to other Island nations for outlets. Voko has addressed this by outsourcing its marketing to CJ Patel & Company Limited (the country's biggest distributor) which already has an established distribution network within Fiji and the South Pacific region.

Being associated with an already established enterprise cushions the difficulties of a new business entity, especially if the new entity is a subsidiary of a successful enterprise. Pacific Batteries is a wholly owned company of CJ Patel & Company Limited. The holding company has used its contacts and alliances to start up the battery manufacturing plant. Their only competitors are imported batteries. However, the already established

network of CJ Patel & Company Limited has given it a niche market compared to the imported goods. Raw materials for Pacific Batteries are supplied from Australia, India, Italy and England. Pacific Batteries has the advantage of importing empty shells of various sizes, completing the processing locally to meet the varied local demand. It has also formed alliances with overseas counterparts by manufacturing the more labor-intensive batteries at lower cost here and than re-exporting. Participation in international meetings of battery manufacturers has exposed this local company to take advantage of technical knowledge and expertise in the repair and maintenance of its plant and equipment. This “piggy-back” treatment undoubtedly is the key to the success of Pacific Batteries Limited.

Fiji’s economy is traditionally agro-based, and FDB’s experiences have shown that a greater degree of success in this sector can be achieved through a processor and contract grower relationship. The country’s sugar cane industry, the dairy sector, some fishing operators and small pockets of vegetable growers for the export market have operated successfully through this supplier-processor relationship. FDB is willing to fund such projects where loan repayment is assured through an assignment over proceeds from the processor. This successful supply chain relationship is shown in broiler projects financed by FDB. Growers were identified by Crest Chicken Limited (processor of meat birds). FDB then funded the construction of broiler rearing sheds. Crest Chicken supplies the day old chicks, chicken feed, medication and technical support. Crest Chicken is allied with Goodman Fielder, a major local distributor of processed food. Goodman Fielder’s distribution network is spread throughout Fiji and some Island nations in the South Pacific. The alliance has proved successful at all levels of operation.

Mark Halabe (garment manufacturer) of Mark 1 Apparel has created a niche for his garments in the Australian market. He attributes his success to the control he and two other shareholders have on the quality of the garments. He has based his factory in Fiji because of the significant savings in labor cost. Nonetheless, he successfully meets his market demand because of his special supply chain management or alliance that he has with his other shareholders. One supplies the raw material from within Australia, and the other is the wholesaler. Halabe concentrates on production because this is his core business. In this way, there is a win-win situation for all parties. Halabe does not subcontract stitching to other smaller operators (this was a practice some manufacturers adopted when garment manufacturing initially started in the late 1980’s to meet increased demand). He likes to have total control over his goods and is not prepared to compromise quality through subcontracting. Outsourcing is done only for embroidery works and dry cleaning as this not Mark 1 Apparel’s core business. Fiji’s garment manufacturers experienced a drop in demand of goods after trade sanctions were placed on Fiji following the coup in May 2000. With an elected government in place now, sanctions have been lifted from Australia and demands have been increasing since.

### **Successful Alliances is Thriving in Supply Chain Relationships**

The working relationship in a supply chain partnership, or some form of alliance (working for the betterment of the operators, the business, and the economy) is emerging and apparent to varying degrees in Fiji. What needs to be understood here is that if this relationship is developing untapped resources, contributing to cost-effectiveness in any business, promotes expansion of local production and generates increased employment, then this is good for the country. Such alliances can be very successful if the various partners have a common goal.

The alliance is not about having the largest share of the pie. It is about doing what one does best, letting the other supply chain partners concentrate on their respective areas,

as long as the end result is the desired goal of everyone. In a developing economy like Fiji, such opportunities should be fostered and encouraged; the desired result will be cost effective and achieved earlier rather than later.

## **ISSUES TO BE ADDRESSED**

In Fiji's developing economy, the government must be fully committed to improving the socio-economic status of its citizens. Fiji is a small nation and any adverse incident quickly affects the majority. Its dependence on a handful of industries can easily bring about further economic downturn if such industries cannot be developed to a level to compete on the global market within the next few years. All focus should be on making the existing industries more competitive, encouraging new investment, from both local and foreign sectors. New investment will stimulate growth of ancillary businesses, thus giving rise to new business growth, and foster further supply chain relationships. With this growth in business and hence in the economy, there will be less brain drain, government coffers will increase and the public infrastructure and amenities will improve. Almost two consecutive years of economic decline is disastrous. The government should move ahead with accelerated pace in addressing the following issues (note that some of these issues have been or are in the process of being addressed):-

### **Political Stability**

There is no stability in policies and practices without a stable government. Investors look for long-term stability for them to invest their funds in a particular country. Fiji already has several strong reasons to support investment growth. It has cheaper labor force, high literacy rate and with English being the main language. It has a well-established communication network and is in close proximity to the major markets of Australia and New Zealand. The western world trading partners are keen to be affiliated with nations where democracy is practiced, and policies foster equal rights.

Immediately after the coup, trade sanctions were imposed on Fiji by Australia and New Zealand, Fiji's major markets. Job losses followed as exports slowed. Demand within Fiji slowed down. Fiji is struggling through its own recession, and the worldwide impending recession will exacerbate the local economy further. Emigration of professional and skilled people has increased after the May 2000 coup. The effect, although has created job opportunities for others, has its disadvantages as well. This is through high staff turnover, organizations losing good staff, and promoting staff who are not ready for the responsibilities are some of the problems facing the bigger organizations. Changing jobs within the country is a common feature as well. Expatriates are expensive, perhaps have a lesser level of commitment, and are discouraged by instabilities.

### **Market and Product Identification**

The local market is obviously very small. Growth in exports will make bulk production viable, providing scale economy for manufacturers. Market, particularly new overseas markets, should be negotiated. Government assistance in identifying export markets should be an ongoing exercise. Fiji has held trade exhibitions in various countries to display its goods, promote joint ventures and offer advice to would be investors on the investment opportunities available. Business councils (made up of overseas and local businessmen, government representatives and service providers) have been active for a number of years, for example, Australia-Fiji, New Zealand-Fiji, USA-Fiji, etc. business



councils facilitate importers and exporters to develop their network and specific alliances.

Recent problems in the U.S. had worldwide repercussions causing a slowdown in global demand and visitor movement, especially by air. Emerging global recession will impact severely on developing countries, which are exporting goods to the western nations under a quota system. To the western nations, this will not matter, but to the exporting nation this quota makes a big difference.

### **Technological/Communication Improvement**

Introducing modern technology in investment and business is essential, if a higher level of trade is desired at the global level. The use of modern plant and equipment that improves production levels, improves quality and contributes to economies of scale should be encouraged. Use of latest IT tools (e.g. e-Commerce) is an area where Fijian businesses should consider investing. The results will be positive.

### **Restore Confidence**

There is an urgent need to restore investor confidence. Fortunately, this important barrier has been partially addressed with the new democratically elected Government. The Government should now resolve the concerns raised on the Constitution. This was reportedly one of the main reasons for the civilian coup in May 2000.

### **Resolve Land Lease Problem**

This is perhaps another issue directly related to local investor confidence. The slow down in investment in the agricultural sector, especially sugar cane, will reduce foreign exchange, and contribute to a higher national trade deficit. The local economy has been heavily reliant on the sugar sector. If this sector is seen to be uncompetitive in the long term, then substitute products should urgently be investigated. Fiji has been receiving premium returns from its sugar exports, through the Lome Agreements. With the Cotonou Agreement, which is now in force, Fiji's sugar industry has until the year 2007 to become globally competitive, as preferences will be phased out by then. The Government has assured that the land lease issue will be resolved by mid-2002.

### **Investment Incentives**

In order to attract investors, specific incentives are important. In its latest national budget, the Government has identified incentives for key contributors to the GDP.

## **CONCLUSION**

Studies on the supply chain relationships between manufacturing industries in Fiji are not available. The contents of this paper are based on discussions held with a selection of manufacturers and related industry personnel. The supply chain relationship in small manufacturing industries is almost non-existent in Fiji. The medium to larger scale industries has some form of supply chain relationship or alliances. Such relationships are very basic and generally one-way. The major industries are export oriented and confined to a few types of activities.

Fiji has strong potential for growth in the SME sector due to its locational advantage to its major trading partners. Support by way of various incentives is what the investors seek from the Government. In the absence of locally available raw materials, manufacturers will source these from overseas. The role of the Government is very

challenging in the current times. It would like the economy to grow; therefore, it has to provide a conducive environment to investors. The incentives offered by the Government have to be simultaneously supported by the outstanding issues that are discussed earlier. Speedy solutions are important now that sanctions have been lifted. SMEs, particularly small enterprises need a lot more support from the Government, and the implementation of the SMED center is a positive move.

## INTRODUCTION

Khadi is a cloth woven using hand-operated loom with hand-spun yarn. The three varieties of Khadi are cotton, silk and wool. In 1925, Mahatma Gandhi established the first association of Khadi producers. It was a symbol of self reliance and independence against the mill made cloth imported from abroad. Two decades later during the 1940s, when independence movement reached its pinnacle, Khadi became the symbol of India's independence struggle. In post independent India, the government of India at the federal level, and the provincial governments at the State level, set up promotional government bodies under the banner of Khadi & Village Industries Commission and Khadi & Village Industries Board respectively.

One major concern of developing countries was, and still is, the generation of adequate employment opportunities and utilization of physical and human resource to the maximum advantage, particularly in rural areas where the majority of the population lives. This concern of India was reflected in the symbol of "charkha", the spinning wheel which, next to agriculture is the most important source of income in rural India.

Under the patronage of the Commission and Board, Khadi, this was hitherto a household, disorganized activity, and gradually evolved into a vibrant sector. While wooden single spindle wheel gradually developed into fabricated metal-based multi spindle "Charkha", employment opportunity increased in manifolds, production multiplied, marketing outlets established, and consumer interest grew. From a household activity, Khadi developed into an expanding industry that could compete with products of the big industries in its own right. Khadi established itself as a marketable product.

Over the years, Khadi grew substantially in value but not in net production terms. This obviously raises the question of quality value versus quantity value of the produce. End users are prepared to pay the price, if the supply of the product is at the right time, of proper quality and as per need. The growth of Khadi as discussed below specifically focuses on the issue of how the product has gained acceptance in the market, grown over the years, but is now faltering trying to keep pace with the tremendously fast changing needs of the market. SCM thus assumes high significance for the entire sector.

## ANALYSIS OF GROWTH

The growth of Khadi in last five decades, since organized production and marketing started is indicated in Table 1 below.

Table 1 shows that though the turnover value production shows sustained growth, employment opportunity is not sustained as is evident from the production figures. Growth in the 6<sup>th</sup> Plan period onwards could not be sustained as can be seen in the 9<sup>th</sup> Plan. Even with the high consumer discount during the Golden Jubilee year of Independence, the 9<sup>th</sup> Plan period could not sustain the growth experienced over the past few years.

**Table 1: Growth of Khadi**

<b>Particulars</b>	<b>Quantity (million m<sup>2</sup>)</b>	<b>Value (million Rupees)</b>
1 <sup>st</sup> Plan – 1955	23.9	55
2 <sup>nd</sup> Plan – 1960	59.4	142
3 <sup>rd</sup> Plan - 1965	84.8	268
4 <sup>th</sup> Plan – 1973	55.7	327
5 <sup>th</sup> Plan – 1978	68.4	648
6 <sup>th</sup> Plan – 1984	103.9	1,576
7 <sup>th</sup> Plan – 1989	108.5	2,353
8 <sup>th</sup> Plan – 1997	111.5	5,220
9 <sup>th</sup> Plan - 2001	95.0	6,340

The fast changing consumer tastes, the opening up of the electronic media to the rural areas, the accelerated development of telecommunication facilities and greater integration with global markets seemed to have adversely affected the steady growth of Khadi. Policy makers had to address the problem. Various expert groups under the chairmanship of the Prime Minister of India as well as Deputy Chairman of the Planning Commission have analyzed the sectoral disadvantages and recommendations have been made to bring forth the reform to put it back on track. Some of the most common ailments identified are:-

- Lack of information about the needs of consensus
- Lack of ability to produce goods to achieve common satisfaction as per changing needs
- Lack of strategic alliances between various producing institutions to build a sustained supply chain
- Inadequate inventory management
- Restrictive laws & regulations
- Lack of product upgrading and product diversification
- Lack of technology upgrading

The supply management of the Khadi institutions started with the procurement of different varieties of raw materials. Each institution has developed a time-tested system to forecast the requirements of raw materials. Projections are made based on the assessment of the national level apex body known as Khadi & Village Industries Commission (KVIC). The Khadi institutions procure raw materials and store in the premises of the production unit. The production of Khadi is made through a network of about 3,000 institutions. These institutions developed a network of sales outlets spread over different parts of the country. There are presently about 8,000 retail sales outlets spread over different parts of the country, each one covering a large geographical area. Khadi products are produced in remote villages and transported to these sales outlets. A major share of Khadi products are sold through sales points located in the urban/city area, whereas the production is undertaken only in units located in villages with the network established by the institutions. About 1.3 million workers are involved in the production process.

Under the leadership of the Deputy Chairman of Planning Commission, a committee was formed in 1999. While identifying the gaps in the Khadi sector, the committee suggested intervention from both ends, i.e. production as well as marketing.

### **INTERVENTION: PRODUCTION**

An area identified as being especially weak is the inability of the sector to rise up to the fast changing needs of consumers. From a very low yarn count of 10/15 counts, highly skilled artisans can produce up to 600 yarn counts. While cloth of around 15 counts can meet the various day-to-day needs of coarse materials, high value materials of pure hand-spun and hand-woven product can cater to demand of discerning customers. Khadi products of 600 counts known as 'Muslin' are so finely woven that a 5 feet width cloth can pass through an ordinary ring. With this large spectrum of product range available, two specific thrust areas identified for stimulation are:

- To create common facility centers
- To promote design & product development.

The gray cloth promoted by artisans requires bleaching and dyeing before they are converted into final products for the shelf. Therefore, a scheme has been designed to build up in artisan clusters, common facility centers run by the institutions to help in value addition of the intermediate products by way of producing facilities for bleaching and dyeing with natural dyes. In the growing worldwide awareness of the benefits of eco-friendly products, this facility will give potential boost to the need of artisans to upgrade their products.

The other important aspect of value addition of the intermediary product is to bring design diversity in fabrics as well as products ready to use in the shape of garments, upholstery, other home furnishings, etc. Leading institutions in the country like the National Institute of Design, National Institute of Fashion Technology and similar institutions of regional repute have been brought under the fold to provide constant input in upgrading and diversification of the product. These interventions have already started yielding results gradually. Value added products in terms of customer preferences are already finding their place in the best of the niche shopping centers. As a result, strain is gradually noticed in the supply chain of Khadi. The country itself with a 1 billion population and a huge potential market has opened up a big challenge to the Khadi sector to cater to the demands of the market.

### **INTERVENTION: MARKETING**

In the marketing front, the thrust areas of intervention identified are:-

- To collaborate with suppliers to form a marketing company
- Modernization of exclusive Khadi retail outlets
- One time liquidation of old and non-market friendly product
- Preparation of product inventory list for country wide distribution and setting up inventory exchanges
- Building up information network for easy access to market feedback.

The marketing company's objective is to encourage open exchange of information so that cooperative relationship can be developed amongst various producers. Constant feedback from the market through the company, which will act as a market intermediary, will bring in collaborating arrangements amongst various institutions in the supply chain. This will reduce the present risk of high inventory and provide constant updating of products as per market requirements.

Modernization of existing exclusive retail outlets selling Khadi under a common brand and logo with standardized quality is another scheme under implementation. In recent years, with the advent of large departmental stores coming up in great numbers in cities and towns, all Khadi selling outlets have become shops of yesterday. Therefore, product upgrading alone will not suffice. The outlets too need to be upgraded. The scheme addresses this feel-good factor of consumers when they shop.

Excess inventory is one major drag on the liquidity position of producers. It is estimated that at any point of time, about Rs.7,500 million worth of inventory is available. At least 20 to 30 percent of the same may not reach the household of the consumer at all. To boost the liquid capital base of producers to invest in production, high value market friendly product, one-time liquidation assistance, up to a limit of 25 percent of the inventory will be granted to clear the inventory at a discount. This will be a very arduous exercise identifying each of the 3,000 institutions for such disposable inventory. Preliminary exercises have already started.

To facilitate the marketing company to have its supply chain in place for meeting demands from either domestic or abroad, a detailed product wise inventory is under preparation. More importantly, the inventory is being exchanged and once fully catalogued, any institution can access the information portal to decide on their production strategy. Apart from channel marketing through the company, this will also build up effective partnership in marketing by way of product exchanges amongst the players.

In today's world, knowledge and information is the essence of business, be it with only rent-seeking or social objective as the goal. Information technology has developed much faster than information inputs are made available in many sectors including Khadi. Thus, this important area is being addressed for the overall growth of the sector.

## **CONCLUSION**

A major strength of Khadi is that it is 100 percent cotton and it is 100 percent manually prepared. It is mostly dyed with natural colors. It is a product that not only provides employment to the large number of people who produce them, but it is also most eco-friendly. It is nature's own product in contrast to mill-made synthetic fabric and chemically dyed product that is common in the market. Consumers' choice is gradually evolving with more sensitivity towards preservation of the environment and healthy lifestyle. This will cause demand for nature-friendly products like Khadi to pick up. Khadi thus has a great future not only in India but also in the global market. It is already being marketed under different brands and names in stores in various countries. Women's apparel and men's suits made of Khadi are available in many European countries, exported by different institutions. However, these are pockets of success stories, still with limited consumer awareness. With greater consumer awareness, better access to information on the availability of Khadi products, and its environmental and health benefits, demand will augment much faster than what the Khadi supply chain can sustain today.

Therefore, there is a great need to collaborate and be partners in the production of Khadi amongst the institutions so that consumer interest can be catered to. There is a need to promote faster product development to keep pace with demand. At the same time, there is a need to invest in e-supply chains, starting from procuring purchase orders to successfully making final deliveries cutting across regional, national and international boundaries.

## INTRODUCTION

PT. Semen Padang, established in 1910, is the oldest cement manufacturer in Indonesia. Competition in the cement business increased sharply in the 1990s. Recently, the economic crisis, and the volatility in international trade had adversely affected the domestic cement business. Even the oldest cement manufacturer, PT. Semen Padang will not survive in the market if it does not manage its supply chain well in order to satisfy consumers. In managing its supply, the company implements the concept of Supply Chain Management with the purpose of achieving its goals, namely, optimizing its distribution facilities, reducing cost, and satisfying the consumers. So far, the result has been positive as it proves that PT. Semen Padang's product is still a leading product in the market.

The cement business is more complicated nowadays. The market structure has shifted from less or no competition when the domestic market was divided into sectors and supplied by a specific manufacturer with local standard price, to a competitive market where market divisions no longer exist and the price is dictated by open market mechanisms. This paper attempts to describe the cement business in Indonesia, a brief history of PT Semen Padang, and the characteristics of the cement product and its distribution system. The implementation of SCM at PT Semen Padang and the evaluation of the performance of SCM are also mentioned.

## THE CEMENT INDUSTRY

The competition in the cement industry in Indonesia is in line with the cement industry, the nation, as well as the region's economic growth. Recently the Asian cement supply has a surplus of about 60 million tons. The consequence of this is that a country that was once an importer of cement has now become an exporter of cement.

In the Indonesian market, there is a surplus of about 18 million tons. Since the economic crisis, demand for cement has decreased sharply while on the other hand the total production increased due to plant expansion carried out before the crisis. This resulted in production capacity exceeding domestic consumption ( $\pm 60$  percent of the total production). Moreover, export prices have dropped making it unattractive for cement producers. This then gave rise to stiff domestic competition. Since the economic crisis in 1997, the business environment has undergone many changes. Some of these changes are mentioned.

### **Economy**

The condition of over supply has caused tight competition in the domestic market. Coupled with low margins from exports, most producers tend to give priority to nearby regional markets to avoid long distance delivery to reduce transport cost. Low economic growth as a result of slower real economic activities in the different sectors has added to the woes.

**Market**

The emergence of foreign cement investors that dominate the local cement industry has changed the less developed domestic market. With the elimination of market divisions and changes in the distribution system using facilities owned by the global players, market condition has changed significantly.

**Social/Cultural Environment**

Increased market competition has made consumers more spoilt for choice. Suppliers have done everything to satisfy their consumers by being prompt in their delivery. The increased awareness of the need to safeguard the environment by the local community at large also means that producers must be careful in how they manufacture their products without polluting the environment.

**Globalization**

With globalization, doing business in a borderless economy with free flow of international trade brings unavoidable competition. The change from a centralized system to a decentralized one has influenced the business processes. The decision by government to eliminate local standard pricing has also affected marketing strategy.

**Development of Information Technology**

The rapid development and advancement of information technology and the global information network has greatly influenced the company's management strategy, especially in the area of marketing.

The change in business environment as mentioned above has caused the company to re-think its management strategies and policies. One way to create value in the system is to implement supply chain management (SCM). According to Bovet and Sheffi (1999), the implementation of SCM is getting increasingly popular due to several supporting factors. First, is the request from the consumers that the company should not be just a producer of high quality and low cost product but also provide services with professionalism. This means the company must be able to operate efficiently, i.e., maintaining a balance between cost and output, as well as provide on time delivery services. The consumers will buy the product if it is easy to obtain, always available in the market with assured quality. Such requirements from the consumers condition the company to give due attention to the supply chain. If the supply chain is not well managed, guaranteed availability of supply in the market will not be achieved. Second, globalization has created a borderless economy making implementation of SCM crucial. Third, competition among suppliers and producers will foster innovation in the supply chain such as the development of technology, establishment of distribution networks, capital investments, adoption of information systems, etc. Fourth, the government plays an important role in fostering implementation of SCM through their policies and support. Before the 1997 economic crisis, the government determined the local standard price but recently, the government halted its intervention and allowed the local standard price to fluctuate according to open market mechanisms.

To ascertain the influence of the above factors, PT. Semen Padang conducted its own market research on the cement industry. The results of the research confirm that to compete effectively in the market, cost leadership strategy is very important because cement is a low price mass product. To maintain market share, improving efficiency and marketing strategy are paramount especially in the timely delivery of product to customers. Market research needs to be conducted continuously to identify and respond to



the changing business environment. So far, the research done on several markets concluded that implementing SCM is essential for the company to survive. In arriving at that conclusion, the market research examined several variables. They are as follows:

- The perception variable. All variables related to perception by the customers, and marketing such as the image of the product, price, place, promotion, delivery, etc. were analyzed.
- The product itself. Variables such as the strength of the product, the color of the product, the lifespan of the product, the packing, the type of bags used, the durability of the bags, as well as the trade mark and logo were examined.
- The delivery variable. Variables studied under this area are the availability of product in the market, accurate quantity and quality of product delivered, speedy and timely arrival of the product after being ordered, and the mode of transportation used.
- The price variable. The areas examined are competition from foreign producers, cost of production, demand from the market, etc.

One key outcome of the results of the research is that of delivery. Consumers want their product to arrive quickly after the order by the fastest possible means of transportation. Besides swift delivery, they also request good packaging and low pricing. Hence, SCM implementation is essential to meet these demands. This paper will discuss the implementation of SCM in PT. Semen Padang, particularly focusing on the delivery of the product from the factory to the end users.

### **PT. SEMEN PADANG IN BRIEF**

PT. Semen Padang, the oldest cement plant in Indonesia, was established on March 18, 1910 as NV Nederlandsche Indische Portland Cement Maatschappij. This plant started its first production in 1913 with a capacity of 22,900 tons per annum. This capacity was extensively increased, and in 1939 reached 170,000 tons per annum, the highest production capacity at that time. During Japanese occupation (1942-1945), Asano Cement Japan managed the plant. When the independence of the Republic of Indonesia (R.I) was proclaimed on August 17, 1945, the employees took over the company and handed it to the government of R.I. and named it Kilang Semen Indarung. The Indonesian's control over the company did not last long. The Dutch, in their effort to re-occupy Indonesia in 1947, regained control of the plant and renamed it NV Padangs Portland Cement Maatschappij. As a result of the Presidential Decree No.50 on July 5, 1958, regarding the nationalization of the industrial and mining companies owned by the Dutch, NV Padangs Portland Cement Maatschappij was nationalized and thereafter managed by central BAPPIT, a government institution in charge of managing industrial and mining companies. The issuance of Government Regulation No.135 in 1961 changed the status of company to a state owned company (PN Semen Padang). That status was later changed to a limited state owned company (PT Persero Semen Padang) after the issuance of Government Regulation No.7 in 1971, under Notary letter No.5 on July 4, 1972.

Pursuant to the Ministry of Finance's Decision No. S-326/MK.016/1995, the government consolidated three state owned companies, namely, PT Semen Gresik, PT Semen Padang and PT Semen Tonasa on September 1995. That resulted in the present day PT Semen Padang which is now in the PT Semen Gresik Group.

## CONCEPT OF SUPPLY CHAIN MANAGEMENT

The principle of SCM is the synchronization and coordination of the activities related to the flow of materials and products both within the organization and outside the organization. The flow of materials and products need the involvement of all parties in the supply chain. Traditionally, the practice within the organization is for the different departments to work in isolation, under the respective department's own standard. However the SCM concept requires all departments to work together as a cross functional team. The synchronization of activities is not only internally within the organization, the SCM approach also recognizes that many of the business activities in an organization must be performed based on cooperation with outside parties.

Different writers proposed various definitions of SCM, but generally, it can be defined as the synchronization of processes from manufacturing to the delivery to the consumers such that the consumers are satisfied. The consumers in the SCM concept are "kings" and must be served as well as possible. The SCM principle is to win the consumers / end users to the product. The parties in the supply chain must work hard with each other to increase the service level and provide low price for the product.

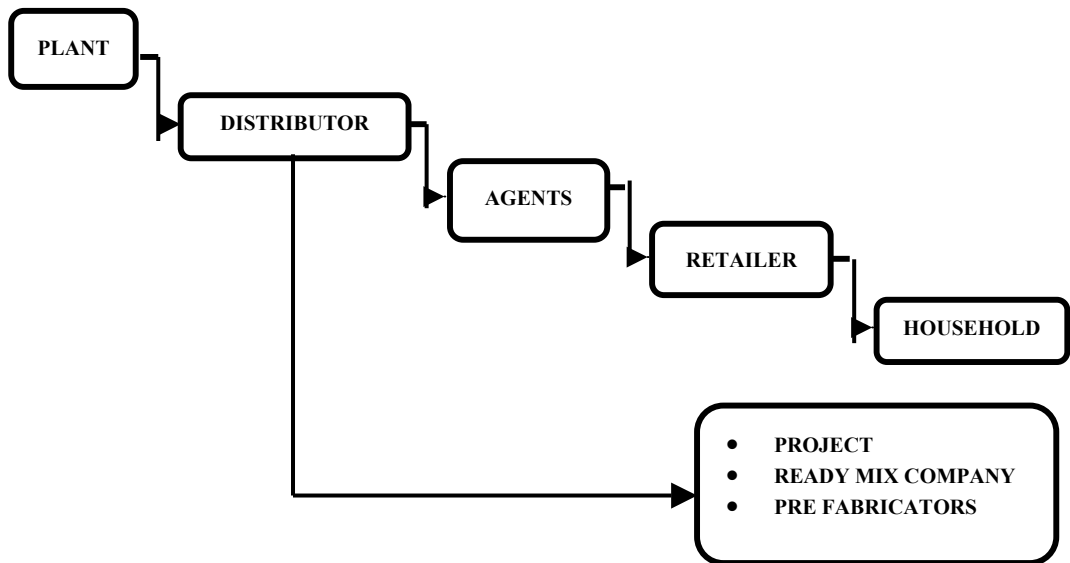
## CEMENT AND CEMENT DISTRIBUTION SYSTEM

### Characteristics

Cement is a raw material for the building industry and can be categorized as a functional product because it has a long product-life cycle (unchangeable). Variations to the product are very limited. The characteristics of the cement industry are easily predicted, i.e., high production volume with a low margin and long product life cycle. The strategy is to get the product close to the consumers and at a low price. For this functional product, market mediation can be done easily because of its long product life cycle. To keep cost low, production must be efficient. To be efficient, the supply chain must be kept simple and well integrated and coordinated between the players in the chain. For example, loading a ship in Teluk Bayur seaport requires inter-organization coordination to avoid loss of time that can cause late delivery of the product to the market.

### Distribution System

The domestic market domain of PT Semen Padang covers central to western Indonesia. The surplus domestic supply is exported. About 63 percent of the product is distributed by sea transportation in bags and bulk, and the rest using land transportation in bags and bulk. The cement distributed by sea is packed in the Teluk Bayur packing plant and the cement distributed through land is packed in the packing plant in the factory area. To execute the loading to the vessel, PT Semen Padang has a special wharf for cement completed with sufficient loading equipment. PT Semen Padang also has 3 packing plants located in the markets of Belawan, Batam and Tanjung Priok. To guarantee proximity of the product to the consumers, the company rents an intermediate warehouse to store the product for the retailers and the construction projects. The distribution channel of the product from the factory to the consumers can be seen in Figure 1.



**Figure 1: Distribution Channel (Domestic)**

## **IMPLEMENTATION OF SCM AT PT SEMEN PADANG**

This section attempts to discuss the implementation of SCM starting from scheduling up to the retailer/end user. The implementation is based on the following objectives:

### **Achieving Target of Increasing Domestic Market Share**

Better management of supply or product distribution to meet the consumers demand is expected to increase the market share. The exact delivery in quantity and quality demanded and its availability in the market will increase the domestic market share.

### **Optimizing Distribution Facility**

By integrating and coordinating inter-organization activities, loading facilities will be fully utilized. For example, 60 percent of the product is delivered using sea transportation. The process of getting the product loaded into the vessel needs proper coordination between internal and external personnel.

### **Reducing Cost**

Integrating and coordinating the various departments in the organization will allow the different groups in the organization to achieve synergy, thereby reducing manufacturing cost and distribution cost. The organization as a whole can then benefit from cost savings, increased productivity and improved work efficiency.

### **Satisfying Consumers**

The consumers will be satisfied if their needs are fulfilled. If the company delivers its product at the appropriate time in the demanded quantity and quality as well as at a good price, the customer will certainly be satisfied. When they are satisfied, they will be loyal and the brand image will be stronger. If this objective is achieved, the organization will reap good profit and increase market share.

Based on the above objectives, and unpredictable changes in the business

environment, as well as the results of the market research conducted, PT Semen Padang tries to implement the SCM concept, focusing particularly on the Marketing Department that manages the activities like storage, distribution and transportation of finished product to the end user. The integration and coordination of these activities are as follows:

### **Marketing Plan**

The team in the Marketing Plan calculates the market demand by forecasting cement demand growth based on economic growth and market share index. The demand data is plotted by market area, type needed, and the mode of transportation is also calculated, e.g., the capacity of vessel needed to transport cement to North Sumatra. The data for the supply plan is plotted further according to distribution, which means the marketing plan, is in a package with the distributor's plan.

### **Production Plan**

The Marketing department brings its supply plan to the production, utility, technique, and logistics departments and sits together to discuss that plan. The synchronization of the activities is done to meet the market demand in terms of quantity, type, packing and the delivery schedule. All aspects are discussed in this team so that figures and commitment are set for implementation.

### **Execution of Delivery**

In executing the delivery, the Marketing department arranges the schedule for the arrival, loading, and departure of the vessel that will carry the cement to the market (for sea transportation). This schedule is synchronized with third parties (external company), such as harbormaster, agents and various people involved in these activities. After the product is transported, it is then monitored to ensure that the product reaches the consumers. For delivery using land transport (truck), the company uses the software Oracle to expedite the loading of cement into the truck. Distribution and transportation management need regular monitoring. If there are changes, these changes need to be synchronized with internal and external parties again.

### **Warehouse Management**

The distributors sometimes handle the delivery of cement from the factory when the sales are FOB factory. The distributors will deliver the product to the retailers and sometimes even up to the end users (i.e. to the project site). If the Marketing department handles the delivery, the product is first stored in the silo or warehouse in the marketing areas managed by the marketing representative office for that area. From the warehouse, the product is delivered direct to the customers. Synchronization and coordination of all parties must be continuously kept within the supply chain so that there is always sufficient stock maintained in the market.

### **Information System**

The company relies on the Internet to communicate with their employees and with all marketing representatives. However, not all suppliers have the Internet facility and so relying on this method of communication may not always be possible and feasible.

### **SCM as Market Mediation**

The company also surveyed the market to make sure that the supply chain used has met the needs of the market and to know the obstacles and perceptions of the market about

the product. Every period, the company holds a meeting with those who are involved in the supply chain to collect information on the problems encountered and to discuss the solutions.

## **EVALUATION**

The implementation of SCM at PT. Semen Padang has yielded some advantages. First, there is an increase in market share in the area where the supply chain is covered. For example, in the Dumai market, which is about 500 km from the plant. Previously, the product for the Dumai market was supplied directly from the factory to the retailer in collaboration with the distributor. However, market research results showed that the supply chain has to be improved. In order to be able to supply the request to that area, a buffer stock warehouse is required. Collaborating with a third party, the company sent the product to the buffer stock warehouse by trucks. That third party manages the product in the buffer stock warehouse. When there is a request from the buyer/retailer, the product can be delivered by that third party quickly, cutting down the delivery time to just 1-2 hours after the order was placed. Whereas before, it took 1-2 days after the order was placed for the product to be delivered. The same activity is now performed in the other market areas. It is expected that the implementation of SCM will increase the market share because the logistics network of the product has become stronger.

Second, there is optimum use of the distribution facility with the implementation of SCM. The implementation of SCM has improved communication and coordination in the organization both internally or externally. Problems that emerge can be resolved quickly and any change of situations and conditions acted on quickly. As an example, consider the loading of cement into the vessel in the Teluk Bayur seaport to transport the cement to the market as requested by the distributor. In this process, the parties involved namely, the stevedore, seaport administrator, surveyor, shipping agent, buyer are all kept informed and coordinated. Through good synchronization, coordination, communication, and efficient use of equipment and distribution facility, loading time target is achieved. This means there is minimal time lost because of effective synchronization and coordination. Before SCM implementation, the waiting time of the vessel from berthing to loading was 3-4 hours resulting in inefficient use of the loading equipment. However, after the implementation of SCM through a common communication channel, these problems are reduced and any alteration in conditions rectified speedily without the barriers of time, distance and place. This yields tremendous savings for the organization. Another example is the delivery of the product from the factory to the retailers by truck. Previously the forwarding took 5-6 hours after the delivery order was placed. Now with the use of software, it only needs 1-2 hours for the product to be delivered to the customer.

Third, consumer satisfaction is achieved by implementing SCM because complaints, problems and changes can be responded to quickly. The interaction between the producer and the consumers is no longer hindered by distance, time or place because of effective and smooth communication using information technology (IT).

Fourth, there is an overall reduction in costs for the organization. The implementation of SCM as a whole has reduced the cost for the organization because it reduces lost time, increases productivity of equipment and manpower, and improves market share. With the use of IT, most transactions are now paperless.

## **SOME BARRIERS IN SCM IMPLEMENTATION**

The implementation and management of the supply chains is no easy task. The complexity of the problems will increase when more external parties are involved in the chain. As the product moves along the supply chain, from the manufacturer to the consumer, it is estimated that 50-60 percent of the movement involves external parties. Other factors that can cause obstruction to the implementation of the SCM are:

### **Differences in Organization Vision**

The difference in vision among the organizations involved in the supply chain and unclear synergy measurement along the channel will hinder successful SCM implementation. Every channel has its own standards and interests and when they get together, the difference in interests will emerge, creating difficulties and barriers in the implementation of SCM. Difference in company cultures also acts as a barrier to successful SCM implementation.

### **Uncertainty in Delivery Process**

Many factors cannot be predicated posing problems in proper SCM implementation. An example is the loading of cement into the vessel when it rains. If it rains at the point of loading of cement into the vessel, it will delay the loading process and affect the schedule of the next loading. The product will get to the market late and opportunities will be lost. Another factor in the delivery process is the limitation of equipment to support the transportation of cement along the supply channel.

### **Non-uniformity of Technology Understanding and Usage**

Non-uniform implementation and comprehension of technology among the supply chain players form a barrier to good SCM practice. For example, if the distributor does not subscribe to the Internet, it will influence the smooth flow of communication and coordination. The inadequate use of IT can become a handicap to inter-organization communication in the supply chain.

### **Skills and Attitude of People**

The skills and the attitude of the people involved can also obstruct the achievement of results through SCM. The placement of the right person with the right skill in the right place is essential to the success of SCM. So far, the recruitment of a person for a specific job still tends towards the use of the collusive and nepotism system. This means that the right person to manage the supply chain is not rewarded. Employing those who are less skillful or not skilled in the area involved made the organization difficult to support its SCM mission. The attitude of the people is also a critical factor. Even if a person is skilled in his area of work but has a poor work attitude, such as being irresponsible, ignorant, careless and uncommitted, it will also hinder successful SCM implementation.

## **CONCLUSION**

The management of PT Semen Padang recognizes that cement is a functional product. To win market share, it needs to adopt the cost leadership strategy, which requires it to be efficient in its processes. Besides using cost leadership strategy, the availability of cement in the market and the proximity of the product to its consumers are major factors to

gain competitiveness. The SCM concept is a tool to achieve efficiency and productivity, and to increase market size through synchronization of activities along the supply chain. A supply chain that has the commitment of the various departments in the organization as well as the full support of external organizations along the chain will create a super chain that will result in higher productivity, reduce costs and improve customer service and loyalty.

This paper focused on the SCM of the finished product cement, from the factory to the market/end users. PT Semen Padang has implemented the concept of SCM by acting on the needs of market with the different players in the supply chain, from the factory to the retailers/end users. This has enabled it to expand and increase its market size. However, the implementation of SCM is not without barriers such as different visions of the organizations involved in the supply chain, unpredictable processes of SCM, non-uniform implementation of IT by different organizations, and the people who carry out the SCM processes. These barriers have influenced the successful implementation of SCM.

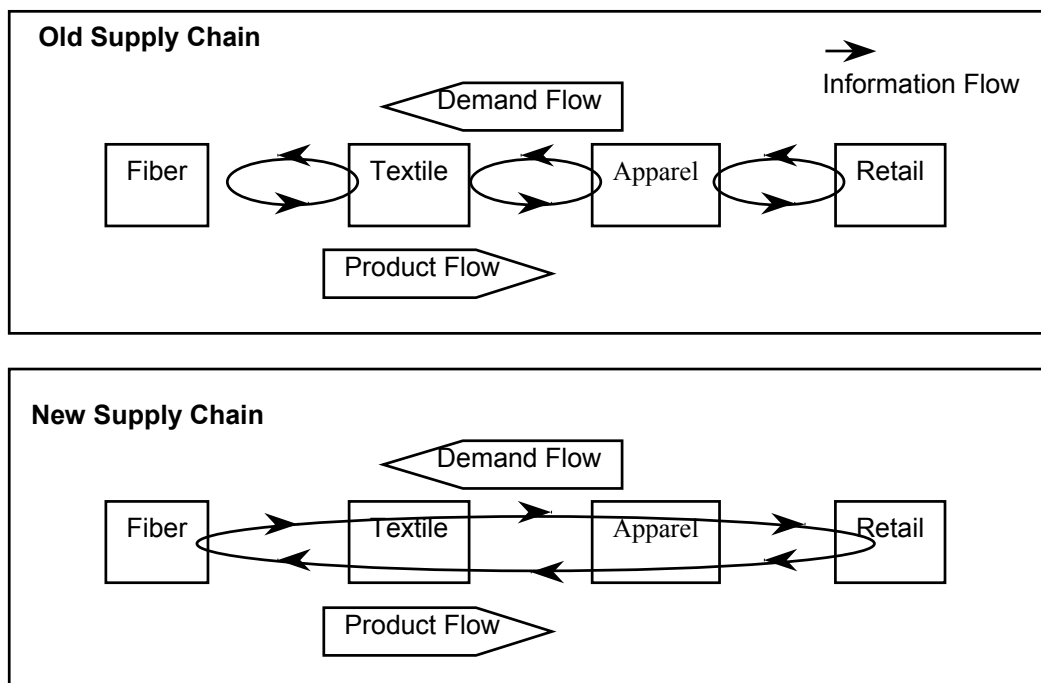
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## INTRODUCTION

Small and medium enterprises (SMEs) have played a crucial role in developing the Korean economy. In general, firms are classified as SMEs if the number of employees in a firm does not exceed 300. There are certain types of businesses that are classified as SMEs even though the number of employees exceeds the above standard, that is, some labor-intensive business such as textile or apparel.

To cope with increasing competitiveness, The Korean textile-apparel companies have tried to adopt information technology (IT) to obtain competitive advantage, to sustain market share, and even to stay in business. Quick Response (QR) is defined as supply chain management (SCM) used to effectively meet with consumer's changing needs at the faster-paced textile-apparel industry (Kincade, 1995; Shin, 1998). Specifically, QR has been widely recognized as a marketing strategy for efficient management of supply chain from fiber to textile, to apparel, and to retail industries. As it makes the flows of merchandise and information fast and accurate in both directions, it can reduce lead-time in producing, and delivering apparel goods to customers and thereby able to quickly respond to changing market needs leading to customer satisfaction (see Figure 1).



**Figure 1: SCM in Textile-Apparel Business**



To address the structural problems in the production and distribution channels of the domestic textile and apparel industry, the U.S. has successfully implemented QR systems and has already shown great results in reviving market competitiveness against foreign countries (Lee, 1996; Choi, 1996).

To integrate SCM effectively, we need to utilize and incorporate QR technologies such as EDI (electronic data interchange), KAN (Korea article number), POS (point of sales), EOS (electronic order system), CAD (computer-aided design) and CAM (computer-aided manufacturing). Among them, POS is one of the most fundamental and valuable information technologies to promote SCM in a practical sense (EAN Korea, 1998). The spinning industry, knitting and weaving mills, and apparel industry can share sales information through POS system. It eventually leads to low prices for consumers by decreasing inventory and maintaining proper level of production across the whole supply chain.

There were some studies, which described the concept of QR as SCM (Hunter, 1990; Kincade, 1995; Kincade, Cassill and Williamson, 1993) and the organizational characteristics affected by the adoption of QR (Kincade and Cassill, 1993). The purpose of this study is to investigate the utilization level of POS and the resulted effects according to introduced period, organizational characteristics (number of employees, annual sales), and user departments applying POS. For the theoretical framework of this study, we used Rogers' innovation diffusion theory (Rogers, 1983; 1986), and the utilization levels of POS system (Cho, 1991).

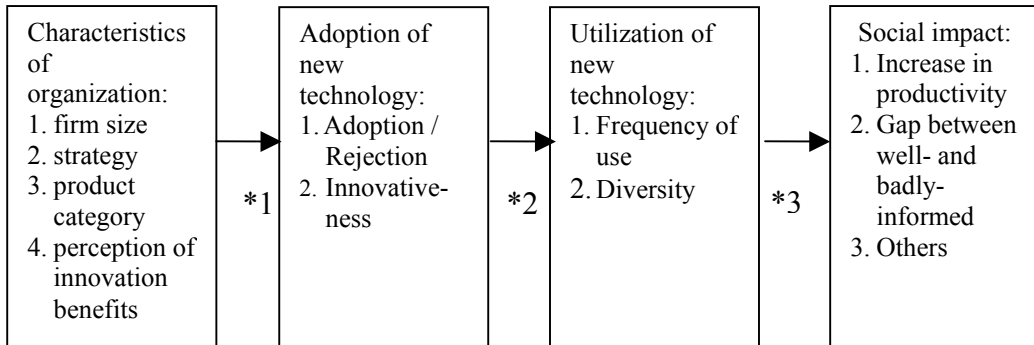
## **BACKGROUND**

### **Innovation Diffusion Theory**

According to Rogers (1983; 1986), the diffusion of new technology in organizations is defined as the process by which an innovation is communicated through certain channels over time among the members of the organization. Based on the theoretical framework of Rogers, most of the research focused on the adoption of QR in the textile and apparel industry and sought to explain the relation between the characteristics of organization and the rate of QR adoption (Kim, 1997; Kim, 1995; Shin & Park, 1998).

However, according to Rogers (1983; 1986), diffusion research in communication technology should not be confined just to the adoption/rejection, but should be expanded to the usage or utilization level and to social effects over time. Time is an important element in the diffusion process because the time dimension is involved in the innovation decision process, in the innovativeness of the unit of adoption, and in an innovation rate of adoption. After the decision of adoption, implementation, re-invention and confirmation over time will it determine the usage and satisfaction level of innovation. Because of the complexity and scope of QR technology, we need to consider the level of QR adoption, that is, the usage and utilization level of QR technology, rather than the dichotomy of adoption/rejection.

As in Figure 2, most of the conventional models for innovation diffusion in the organization have focused on the relationship between the independent variables and the dependent variables as indicated in the arrow \*1. However, the new technology study has expanded the area of diffusion study by including the relationship indicated in the arrow \*2 (relation in the utilization of new technology) and the arrow \*3 (the elements related to the social effect of new technology). Thus, this study focused on the second step of the Rogers' adoption theory: utilization of new technology.



**Figure 2: Rogers' Theory on Diffusion of Innovation**

### **SMEs in Textile-Apparel Business**

SMEs have played a crucial role in developing the Korean economy in the context of the national economy; the share of SME's employment accounts for 70 percent of the total employment, and the product share for over 46 percent, and export volume for over 42 percent. Korean SMEs made a great contribution to Korean economic growth and has continued to develop in numbers. As a result, SMEs account for 99.1 percent in the number of establishments and 74.4 percent in the number of employees in all industries. This fact implied a far firmer standing of SMEs whose role had become more and more important in boosting Korean economic growth.

In 1997, on the employees of small and medium manufacturing companies, the proportion of the manufacture of textiles was at 10.2 percent, and the wearing apparel and fur articles at 7.8 percent. As for gross output in the manufacturing industry in 1997, with regard to the proportion of small and medium manufacturing companies of gross output by industry, the manufacture of textiles was 8.2 percent, and wearing apparel & fur articles was 3.6 percent. Profiling by type of business of small and medium manufacturing companies, the manufacture of textiles in 1997 showed a growth rate of 9.7 percent, and the wearing apparel and fur articles grew 9.0 percent (Yoon & Lee, 2000).

### **QR as SCM and POS**

QR is a set of actions a supply chain takes that lead to a reduction in replenishment lead-time. Supply chain managers are able to increase their forecast accuracy as lead times decrease, which allows them to match supply with demand better and increase supply chain profitability (Chopra and Meindl, 2001). Kurt Salmon Associates (KSA) first introduced the concept of QR in 1978. Later, it was defined by many associations and scholars (Kincade, 1995; Hunter, 1990; Sullivan, 1990; VICS, 1989; TALC, 1988).

In general, the development of QR can be divided into five stages (EAN Korea, 1998) and POS system plays an important role in each development stage. Each stage shows how the introduction of POS has improved productivity, revenue, reduced costs, and their quantum of savings. The first stage is the construction of the POS system, as the base technology of QR, to manage sales electronically by scanning source-marked items. Therefore, the pre-requisite condition for the POS implementation is the use of the standard bar code in the whole fashion industry.

In the second stage, we can predict the sales on a daily or weekly basis using the POS sales data, and can execute EOS in order to replenish the store inventory

automatically. That is, for each store and for each item, the standard level of inventory is predetermined. If the present level of inventory is below the standard level, EOS automatically identifies the item, calculates the quantity to be replenished, and transmits the order to apparel manufacturers, using the on-line sales information from POS.

In the third stage, as apparel manufacturers and distributors jointly share the information on the product planning as well as POS sales data, the automatic replenishment, while maintaining appropriate level of inventory, can be executed in a shorter period, leading to the establishment of partnership between parties.

The fourth stage is the mature stage of QR. Retail dealers analyze the POS data on each item for inventory management, and make orders according to the customers' demand projected. The demand analysis on POS data is needed to properly meet with the change in the market, even though it cannot cover all the changes such as the change in total sales, change in demands by promotion or events, and effect of climate on demand.

In the fifth stage, the joint development and deployment of a new product is executed. For each store, pre-test results on new products and the adaptation speed and process to the markets are analyzed from the POS data.

To construct QR system, we need the wide diffusion of the KAN code in the whole fashion industry, the standardization of EDI, the development of POS system, and the utilization of these technologies. However, when reviewing the current situation of the utilization of QR in the Korean fashion industry, information exchange across companies as well as across industries is insufficient, each firm is promoting proprietary non-standard QR system, and the fashion industry has a closed distribution channel (Chang, 1996).

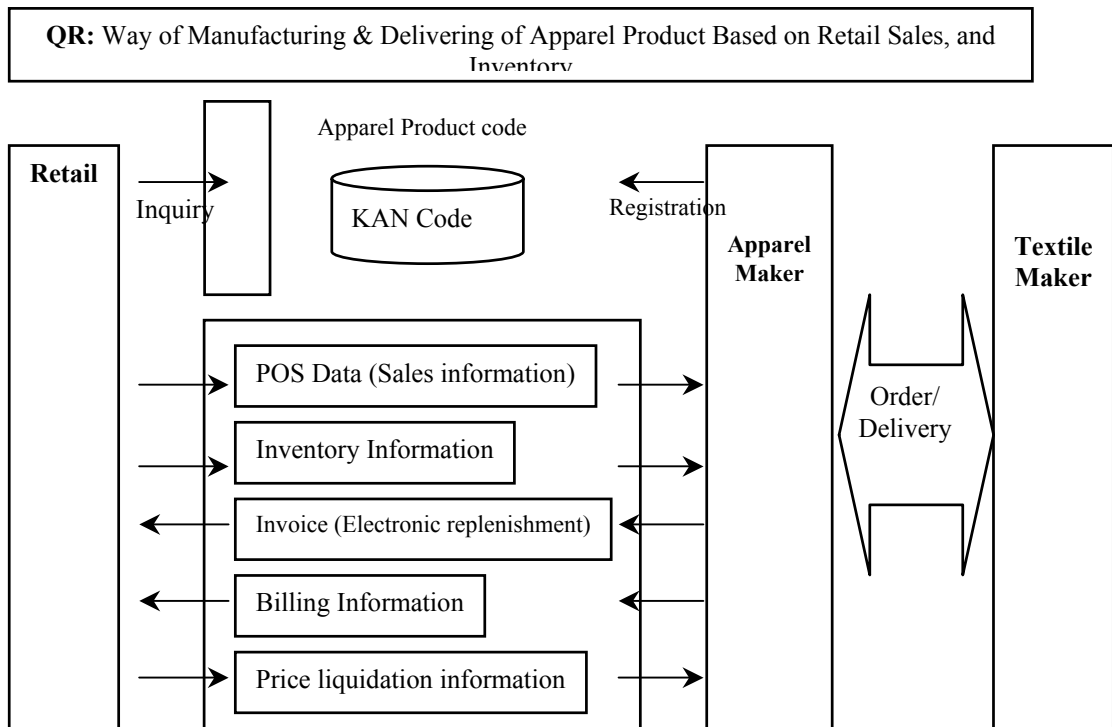


Figure 3: QR as SCM and POS

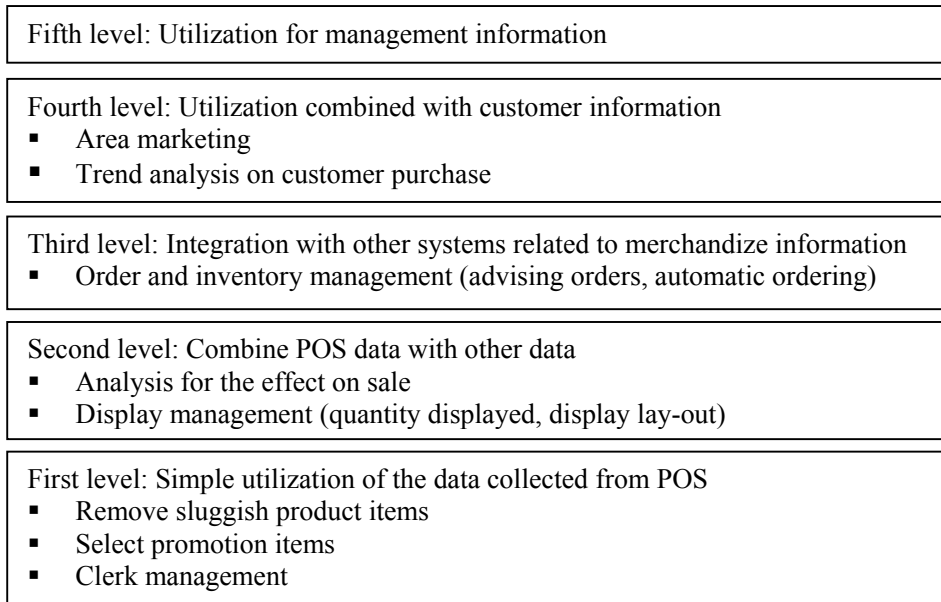
The POS system is an integrated computer system for the effective performance of retail business activities by managing information on sales, ordering, purchasing, inspecting and testing, and customers at the point of sales (Cho, 1992) (see Figure 3). The POS system drew the attention of the Korean industry in early 1980s for the first time, and was introduced in the 1983 by the Korea Chamber of Commerce and Industry (KCCI). Korea has joined the IAN (International Article Numbering Association) as the thirty-sixth country at the fourteenth general meeting of IAN, held in May 1988. Korea was endowed with the identification number 880 and established KAN system. In June of the same year, KCCI found the EAN Korea. In the Korean fashion industry, 40 or 50 companies have adopted the POS system (EAN Korea, 1998).

Collected POS data should be utilized as on-line information useful for merchandising, advertisement and promotion, distribution and logistics management by analyzing customer's purchase behavior and demand trend. The information provides the firms with the foundation for the systematic marketing management. The benefits of POS implementation to highlight productivity improvements, customer satisfaction, and better management are exemplified in Table 1 (EAN Korea, 1998).

**Table 1: Benefits of POS Implementation**

<b>Benefit area</b>	<b>Benefits of post-POS implementation</b>
Sales management by clerk	<ul style="list-style-type: none"> <li>• When registering a sale through POS terminal, the identification number of individual sales clerk is entered at the same time. POS system can manage sales by individual clerk.</li> </ul>
Merchandise turnover	<ul style="list-style-type: none"> <li>• Fulfill the wants and needs of customers and increase sales</li> <li>• Restrain below-cost discounts and reduce inventory cost through trend analysis of market demand</li> <li>• Estimate anticipated order amount</li> </ul>
Systemized promotion	<ul style="list-style-type: none"> <li>• Check the effect of store layout and promotion events</li> <li>• Identify and review what specific items sell well in which stores</li> </ul>
Price policy	<ul style="list-style-type: none"> <li>• Timely pricing on merchandise</li> <li>• Check the conditions of discount</li> <li>• Identify customers' price sensitivity on purchasing through the analysis of price line and price zone</li> <li>• Price zone management according to business policy</li> </ul>
Merchandise portfolio	<ul style="list-style-type: none"> <li>• Identify fast/slow merchandise early</li> <li>• Active adjustment in merchandise portfolio</li> </ul>
Brand selection	<ul style="list-style-type: none"> <li>• Evaluate brands according to certain criteria</li> </ul>

Cho (1991) classified the utilization level of POS data into five levels (Figure 4) according to the complexity of application.



**Figure 4: Utilization Levels of POS Data**

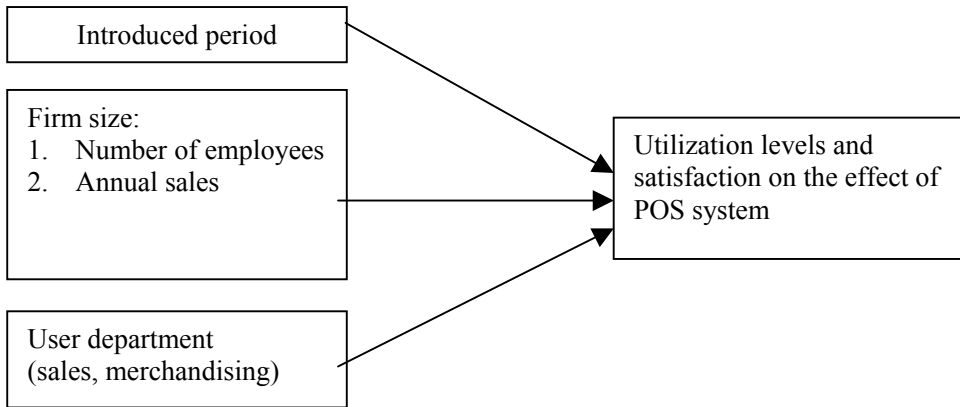
## **RESEARCH METHOD**

### **Hypothesis**

The purpose of this paper is to investigate the utilizing levels and effects of POS based on Rogers' adoption theory and Cho's study as a conceptual framework. For this study, the introduced period, firm size (number of employees, annual sales), and POS user department were selected as independent variables. The introduced period and firm size from Rogers' adoption theory (1983, 1986) were mentioned in several studies. Kincade (1989) and Sullivan (1990) found positive relationships between the size of firms and QR adoption in the apparel industry. That is, the bigger the size of firms (organizations), the higher adoption of new technology the firms showed. This study considered sales and merchandising (merchandise planning) department as the most active POS user department in the fashion industry based on Cho's study.

This research examines the relationship between organization characteristics (introduced period, firm size, and POS user department) and the utilization level and effect of POS as proposed in the following hypotheses (Figure 5).

1. H1. Introduced period is related to the utilization level and satisfaction on the effect of POS.
2. H2. Firm size (number of employees, annual sales) is related to the utilization level and satisfaction on the effect of POS.
3. H3. POS user department (sales and merchandise department) is related to the utilization level and satisfaction on the effect of POS.



**Figure 5: Research Model**

### **Data Collection and Instrument**

Sixteen sample companies were randomly selected from a list of 50 Korean apparel firms that adopted the POS system. Among the 75 questionnaires sent to the managers of the apparel firms utilizing POS system at the end of 1998 - 1999, 59 were collected and used for this study.

A questionnaire was developed for the study. The details of questionnaire were composed as follows:

1. The general characteristics of apparel firms: company name, the established year, number of employees, annual sales, the introduction time of POS.
2. The utilization levels of the POS system, and the degree of satisfaction on the effect of POS data analysis and application.

Statistical analyses performed were t-test and frequency with the SAS program.

## **RESULTS AND DISCUSSION**

### **Profile of Respondent Companies**

The adjusted response rate was 78.7 percent (n=75). The general characteristics of the companies that adopted the POS system are as follows: The most common firm sizes were over 300 employees (59.3 percent), and 100-299 employees (40.7 percent). The most common groups by annual sales were over 100 billion won (53.4 percent), and under 100 billion won (46.6 percent). The most common user departments were merchandising (40.7 percent), sales (33.9 percent), and information (25.4 percent). The most common introduced periods of the POS system were over 3 years (before 1995, 73.2 percent), and under 3 years (after 1995, 26.8 percent).

### **Analysis on Utilization Levels and Effect of POS System**

#### ***Introduced Period***

Firms that have introduced the POS system for a longer period use the POS, at the first level, to adjust inventories among the stores when misbalancing deepened. The companies that have introduced the POS system for a shorter period have relatively well

utilized POS, at the second level, in price analysis. Even though there is no significant difference, firms that have introduced the POS system for a longer period have utilized POS more at the first and second levels except for the price analysis.

Tables 2 and 3 show that when investigating the satisfaction on the effect of the POS system by the introduced period, the firms that have introduced the POS system for a longer period (more than 3 years) are more satisfied with the increase in the turnover of merchandise ( $p<.05$ ), analysis and management on the price zone ( $p<.001$ ), and the effective personnel arrangement and operation ( $p<.01$ ).

**Table 2: Utilization Level of POS System**

Level	Utilization level of POS system	Introduced period		t-value
		Under 3 years	Over 3 years	
1st	Check on over-stocked and out-of stock items	4.30	4.75	-1.45
	Remove rarely demanded merchandise	3.44	3.71	-0.76
	Identify store where specific item (brand) sells well	4.44	4.46	-0.05
	Identify sales trend by items	4.18	4.56	-0.96
	Adjust inventories among stores when misbalancing deepened	3.70	4.39	-1.79*
	Identify fast/slow merchandise	4.18	4.26	-0.31
2nd	Check optimal level of inventory and stock displayed	3.90	4.21	-1.05
	Price analysis (price zone management)	4.00	3.37	1.88*
	Analysis on weekly sales trend	4.45	4.53	-0.31
	Merchandise planning (order quantity, merchandise portfolio, size and color analysis)	3.50	3.86	-0.82
3rd	Automatic ordering and inventory management	2.90	2.84	0.13
4th	Analysis on trend of customers	2.70	2.42	0.54

\*  $p<.05$ ; (1: very unsatisfied – 5: very satisfied)

**Table 3: Degree of Satisfaction of POS System**

Effect of POS	Introduced period		t-value
	Under 3 years	Over 3 years	
■ Effect in merchandise planning			
Quick evaluation on new merchandise	4.36	4.31	0.18
Improved logistics in warehousing and delivering	4.09	3.96	0.42
Increase in turnover of merchandise	3.33	4.13	-2.02*
Merchandise development based on the needs of customers and checking out-of-stock items	3.63	4.03	-1.09
Analysis and management on price zone	3.16	4.17	-3.58 <sup>+</sup>
Increased accuracy in production planning due to accurate sales information	3.33	3.78	-1.30
Maintaining optimal level of inventory	3.16	3.60	-1.24
Identify purchasing trends of customers and making loyal customers	3.50	3.69	-0.76
Reduce market survey expenses	2.63	3.00	-1.02

Build proper advertisement strategy through causal analysis	3.11	2.66	1.17
■ Effect in store operation			
Speedy information on current sales statistics	4.50	4.39	0.31
Automatic checking on inventory stocks	4.00	4.30	-1.15
Improved merchandise display layout through differentiation of popular and unpopular merchandise	3.83	4.17	-1.21
Effective personnel arrangement and operation.	2.66	3.43	-2.62**

\* $p < .05$  \*\* $p < .01$  + $p < .0001$

### Size of Firm

#### (1) Number of employees in company

Table 4 shows that firms with more than 300 employees effectively utilize the POS system at the third level, automatic ordering and inventory management ( $p < .05$ ). When investigating the satisfaction on the effect of the POS system by the number of employees, firms with more than 300 employees are more satisfied with the POS system in gaining speedy information on the current sales statistics ( $p < .05$ ).

**Table 4: Utilization Level of POS System by Firm Size**

Level	Utilization levels of POS system	Number of employees			Annual sales		t-value
		<300	> 300	t-value	< 100 bn won	> 100 bn won	
1st	Check on over-stocked and out-of stock items	4.68	4.57	0.49	4.73	4.52	0.99
	Remove rarely demanded merchandise	3.78	3.65	0.41	3.77	3.63	0.46
	Identify store where specific item (brand) sells well	4.26	4.60	-1.21	4.27	4.63	-1.34
	Identify sales trend by items	4.64	4.37	1.05	4.45	4.50	-0.19
	Adjust inventories among stores when unbalancing deepened	4.26	4.23	0.13	4.22	4.26	-0.14
	Identify fast/slow merchandise	4.41	4.18	0.96	4.20	4.33	-0.57
	Average	4.28	4.28	0.02	4.25	4.30	-0.32
2nd	Check optimal level of inventory and stock displayed	4.26	4.4	0.57	4.16	4.17	-0.02
	Price analysis (price zone management)	3.50	3.70	-0.65	3.42	3.79	-1.24
	Analysis on weekly sales trend	4.47	4.48	-0.04	4.55	4.41	0.59
	Merchandise planning (order quantity, merchandise portfolio, size and color analysis)	3.94	3.76	0.45	3.73	3.91	-0.48
	Average	4.00	3.97	0.16	3.89	4.04	-0.83
3rd	Automatic ordering and inventory management	2.21	3.16	-2.41*	2.26	3.17	-2.31*
4th	Analysis on trend of customers	2.20	2.69	-1.53	2.22	2.73	-1.67

\*  $p < .05$  (1: not at all ~ 5: very much)



## (2) Annual sales

Firms with more than 100 billion won in sales are also well utilizing the POS system in automatic ordering and inventory management ( $p<.05$ ) (see Table 4). When investigating the satisfaction on the effect of the POS system according to annual sales, the firms that have more than 100 billion won in sales are more satisfied with the POS system in merchandise development based on the needs of customers and checking out-of-stock items ( $p<.05$ ), reduction of market survey expenses ( $p<.05$ ), building the proper advertisement strategy through the causal analysis ( $p<.001$ ), improved logistics in warehousing and delivering ( $p<.01$ ), quick evaluation on new merchandise ( $p<.05$ ), and speedy information on the current sales statistics ( $p<.05$ ) (see Table 5).

**Table 5: Degree of Satisfaction of POS System by Firm Size**

Effect of POS system	Number of employees			Annual sales		
	< 300	> 300	t-value	< 100 bn won	> 100 bn won	t-value
■ Effect in merchandise planning						
Quick evaluation on new merchandise	4.37	4.29	0.31	4.10	4.50	-1.68*
Improved logistics in warehousing and delivering	3.81	4.11	-1.16	3.63	4.29	-2.84**
Increase in turnover of merchandise	3.93	3.94	-0.02	3.77	4.14	-1.12
Merchandise development based on needs of customers and checking out-of-stock items	3.94	3.92	0.04	3.55	4.25	-2.38*
Analysis and management on price zone	4.06	3.70	1.37	4.05	3.64	1.57
Increased accuracy in production planning due to accurate sales information	3.66	3.70	-0.14	3.55	3.85	-1.15
Maintaining optimal level of inventory	3.60	3.52	0.25	3.38	3.78	-1.49
Identify purchasing trends of customers and making loyal customers	3.46	3.58	-0.50	3.66	3.35	1.30
Reducing market survey expenses	2.85	2.92	-0.21	2.61	3.13	-1.74*
Build proper advertisement strategy through causal analysis	2.46	2.92	-1.39	2.18	3.18	-3.58***
■ Effect in store operation						
Speedy information on current sales statistics	4.13	4.58	-1.88*	4.16	4.64	-1.97*
Automatic checking on inventory stocks	4.20	4.23	-0.16	4.11	4.35	-1.14
Improved merchandise display layout through differentiation of popular and unpopular merchandise	4.06	4.11	-0.24	4.05	4.14	-0.41
Effective personnel arrangement and operation.	3.26	3.23	-0.12	3.27	3.21	0.26

\*  $p<.05$  \*\*  $p<.01$  \*\*\*  $p<.001$ (1: not at all ~ 5: very much)

### User Department

Merchandising department are utilizing the POS system in identifying sales trend by items ( $p<.05$ ), early identification of fast/slow merchandise ( $p<.05$ ), merchandise planning (order quantity, merchandise portfolio, size and color analysis) ( $p<.01$ ) is better in the merchandising department than the sales (distribution) department (see Table 6).

**Table 6: Utilization Level of POS System by User Department**

Levels	Utilization levels of POS system	User department		t-value
		Merchandizing	Sales	
1st	Check on over-stocked and out-of stock items	4.68	4.55	0.60
	Remove rarely demanded merchandise	3.61	3.78	-0.56
	Identify store where specific brand sells well	4.47	4.47	0.00
	Identify sales trend by items	4.70	4.20	2.05*
	Adjust inventories among stores when unbalancing deepened	4.19	4.30	-0.41
	Identify fast/slow merchandise	4.45	4.05	1.82*
2nd	Check optimal level of inventory and stock displayed	4.04	4.30	-1.00
	Price analysis (price zone management)	3.78	3.45	1.11
	Analysis on weekly sales trend	4.50	4.45	0.22
	Merchandise planning (order quantity, merchandise portfolio, size and color analysis)	4.29	3.26	3.07**
3rd	Automatic ordering and inventory management	2.85	2.77	0.17
4th	Analysis on trend of customers	2.47	2.55	-0.23

\*  $p<.05$  \*\*  $p<.01$  (1: not at all ~ 5: very much)

As for the satisfaction on the effect of the POS system according to user departments, the merchandising department is more satisfied with reducing market survey expenses ( $p<.05$ ), and the quick evaluation on new merchandise ( $p<.05$ ) (see Table 7).

**Table 7: Degree of Satisfaction of POS System by User Department**

Effect of POS system	User department		t-value
	Merchandizing	Sales	
■ Effect in merchandise planning			
Quick evaluation on new merchandise	4.50	4.10	1.68*
Improved logistics in warehousing and delivering	4.04	3.95	0.37
Increase in turnover of merchandise	4.07	3.83	0.72
Merchandise development based on needs of customers and checking out-of-stock items	4.37	3.40	3.55
Analysis and management of price zone	3.85	3.88	-0.11
Increased accuracy in production planning due to accurate sales information	3.78	3.61	0.65
Maintaining optimal level of inventory	3.57	3.55	0.05
Identify purchasing trends and making loyal customers	3.42	3.61	-0.75
Reduce market survey expenses	3.14	2.63	1.70*

Build proper advertisement strategy through causal analysis	2.95	2.52	1.35
■ Effect in store operation			
Speedy information on current sales statistics	4.28	4.44	-0.62
Automatic checking on inventory stocks	4.21	4.22	-0.03
Improved merchandise display layout through differentiation of popular and unpopular merchandise	4.00	4.16	-0.79
Effective personnel arrangement and operation.	3.14	3.33	-0.79

\*  $p < .05$  (1: not at all ~ 5: very much)

## CONCLUSION

Because the change in the fashion market occurs very rapidly in modern society, it is very important to get the market sales information, which reflects the actual and future demand of consumers, in real time. The fast flow of information will also lead to shortened lead-times and reduced inventory stock from raw materials to final products in the physical world. Considering the fashion industry as an information integrated business, the POS system in QR is therefore considered an important infrastructure for gaining competitive advantage in the industry.

The purpose of this study is to investigate the utilization levels and the satisfaction on the effects of POS system in the fashion industry in Korea. The results are as follows:

1. The firms that have introduced the POS system for a longer period (more than 3 years) better utilize the POS system for adjusting imbalanced inventories among the stores at the first level and for price analysis at the second level than those introduced for a shorter period. On the satisfaction on the effects of the POS system, longer-introduced firms are significantly more satisfied with the increased turnover of merchandise, analysis and management on price zone, and the effective personnel arrangement and operation.
2. When reviewing the utilization levels of the POS system according to the size of company, the bigger firms, both in terms of the number of employees and the volume of annual sales, significantly better utilize the POS system for automatic ordering and inventory management at the third level. Concerning the effects on merchandise planning, the bigger firms in terms of annual sales are significantly more satisfied with proper advertisement strategy, improved logistics in warehousing and delivering, merchandise development based on the needs of customers, reduction in the market survey expenses, and the quick evaluation on new merchandise. As to store operations, the bigger firms in both the number of employees and annual sales terms showed more satisfaction with the provision of speedy information on the current sales statistics.
3. For the user department, the merchandising departments are better utilizing the POS system to identify sales trend by items and fast/slow merchandise, and for merchandise portfolio planning than the sales department. Also, the merchandising departments are more satisfied with the effects on reducing market survey expenses and quick evaluation on new merchandise. Therefore, the merchandising department seems to be more sensitively coping with the response and flow of consumers on the new merchandise and adjusting the direction of merchandise portfolio through the sales analysis.

As a whole, the firms that have introduced the POS system utilize it very well at the first and second levels, but not at the third or fourth levels. Also, firms showed high satisfaction on most of the effects of the POS system.

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## INTRODUCTION

The ASEAN Free Trade Area (AFTA) will commence in the year 2005 for the ASEAN region. In that year, market liberalization practice among the ASEAN countries will be adopted. It is expected to spur free trade flows among these countries resulting in bigger market capacity. Under this market liberalization practice, all government trade tariffs and barriers will be abolished and there will be minimal restrictions on free flow of trade. Adopting common trade practices and tariffs will facilitate the success of the free trade flow.

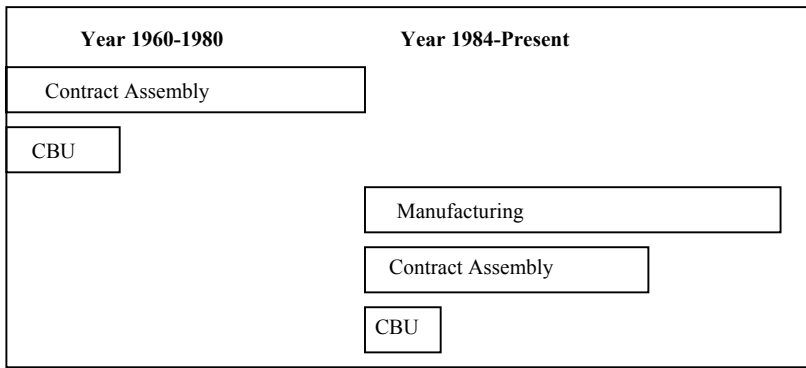
For the automotive industry, countries like Malaysia, Thailand and Indonesia will play a pivotal role within the ASEAN countries as they have the largest vehicle population compared to the rest of the ASEAN countries.

## AUTOMOTIVE INDUSTRY (MANUFACTURING AND ASSEMBLY)

### History of Malaysian Automotive Industry's Supply Chain

Before 1980, the supply chain of the automotive industry in Malaysia started with contract assembly where the franchised holder purchased the completely knocked down units (CKDs) directly from its principal manufacturer. Back then, all the parts come in complete CKDs and local parts utilization was minimal. A substantial number of vehicles were also brought in through the completely built-in unit (CBU) shipment method. Initially, contract assembly vehicles and CBU imports account for 70 percent and 30 percent respectively of the total automotive industry volume. However, upon the construction and commencement of the Proton plant in the early 1980s, Malaysia embarked remarkably into the automotive industry. Local parts vendors and suppliers of local parts flourished with many new investments flooding into the country yielding high turnover. Propelled by the Proton brand and with a strong footing in the automotive industry, other National manufacturers like Perodua, Modenas, HICOM, Inokom have benefited from the same initial investment facilities and network. The economic chain effect has expanded the base even further, creating a competitive edge against other auto suppliers in the country. With a larger manufacturing market and increasing cost competition, reduction in assembly and CBU quantities is inevitable. At present, production vehicle under the National manufacturer brand accounts for the largest volume of 72 percent, contract assembly 20 percent and CBU import 5 percent only. Figure 1 shows the profile of the Malaysian automotive industry.

The National manufacturer under its own distribution networks as well as being the sole distributor for the local and export markets presently manages distribution of automobiles. The distribution, product, and branding rights are under the sole responsibility of the National manufacturer. In contrast, under the contract assembly method, distribution rights are granted to the local company, i.e. the franchise holder but the product and branding rights are still under the principal manufacturer's sole authority



**Figure 1: Profile of Malaysian Automotive Industry**

for example, ISUZU Motors Limited for the ISUZU product and brand, Mitsubishi Motors Corporation for Mitsubishi to name a few.

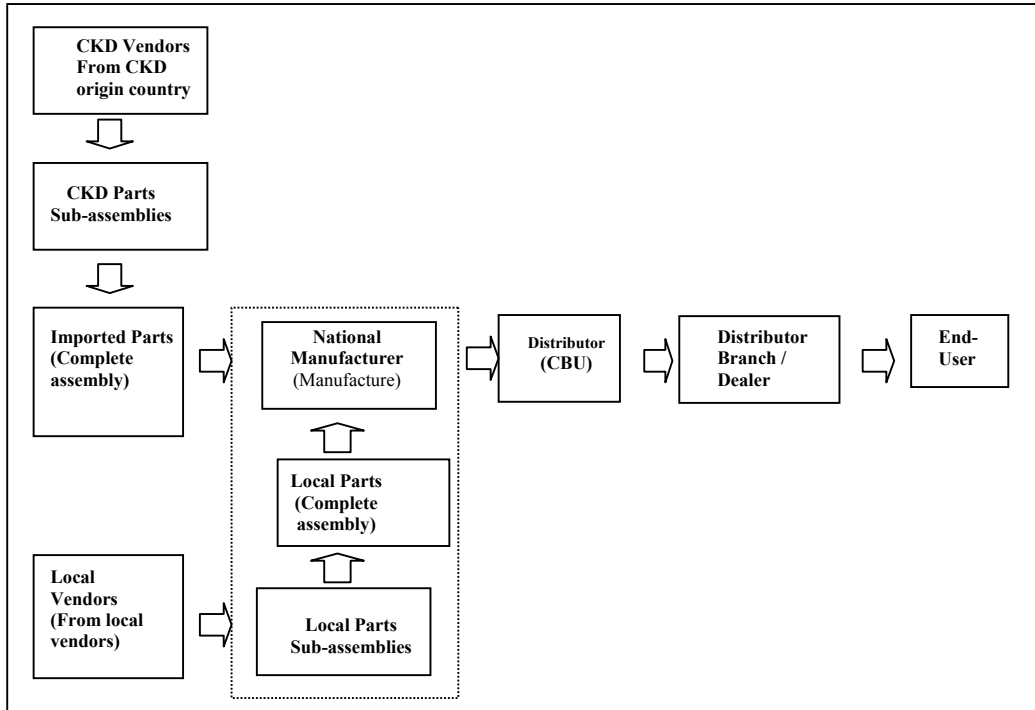
The consequence is that, unlike the National manufacturer, any product development and parts localization is under the jurisdiction and liberty of each franchise holder's principal manufacturer. Hence, to have a favorable balance of payment in the principal manufacturer's home country account, these manufacturers are less willing to localize at the importing country as it may reflect a lower selling price in their home country. Additionally, these manufacturers are bound by their home country's government regulation for spurring the economy by supporting their home parts vendor industry.

However, the drawbacks and risks involved in developing the automotive industry through the implementation of a manufacturing system compared to an assembly production system are as follows:

1. Huge capital requirements for National manufacturer. A manufacturing plant with 60,000 units per annum production capacity may incur up to RM 272 million (US\$ 72million) capital investment.
2. Long capital recovery period. It takes about 15 to 20 years to recover the initial capital outlay. In addition, these machineries have life spans of between 25 to 30 years which means high maintenance cost is expected.
3. Adequate production volume must be available for economies of scale. At production efficiency of 80 percent and 60,000-units plant production capacity, a minimum breakeven level should at 1,750 units. The major bulk of the contribution would derive from recovering the manufacturing fixed costs on the facilities, machineries and equipment.
4. A large number of vendors are dependent on the National manufacturer as the anchor company. At least 60 parts vendors are under the umbrella of the National manufacturer. These vendors provide income for nearly 12,000 workers with capital investments of at least RM 500 million (US\$110 million) in total.
5. Cost is an important element in the automotive industry because of the high fixed costs. Uncompetitive in an unprotected industry, the National manufacturer can easily be swiped away by the giant players in the market. Manufacturing fixed costs account for 65 percent-70 percent of the total manufacturing costs to a manufacturer. These fixed costs can only be recovered over a span of time.

### **National Manufacturer Supply Chain**

Figure 2 shows the supply chain of the National automotive manufacturer.



**Figure 2: Supply Chain of National Automotive Manufacturer**

Imported parts such as engine, transmission, and axle are ordered directly from the original manufacturer's origin country. In the origin country, the imported parts are being assembled from its child part into a complete assembly depending the level of CKD breakdown as per described between the National manufacturer and the principal manufacturer. Upon completely assembled into a component, the imported parts are then sent to the National manufacturer's plant for complete assembly into a CBU. The vendors and parts development, quality and workability of the parts are being developed and warranted by the principal manufacturer. However, the localized parts are developed domestically in the National manufacturer's country. A number of parts vendors are appointed by the National manufacturer to develop the parts with the assistance of the technical partner from the origin country. The local parts vendors acquire the technology transfer from the technical partner starting from the child part assembly and manufacturing until the component is completely assembled and tested. However, the system's complete assembly (example, wiring) is usually done at the National manufacturer's production plant. The manufacturer is responsible for the vendors and parts development including testing to avoid defective or unapproved parts being supplied to the production line and later, assembled into the vehicle.

In view of the many sub-assemblies and works requirement since the CKD and local parts are supplied in loose form, the National manufacturer needs to set-up a comprehensive and integrated production facility, a huge capital investment for the manufacturer.



## **UNDERSTANDING SOURCES OF COMPETITIVE PRESSURE AND IMPACT OF AFTA ON PARTS VENDORS**

The consequence of AFTA on the local parts vendors, which are mostly SMEs, are driven mainly from three sources:

### **Shift of Strategic Policy of National Manufacturer in Ensuring Competitiveness and Survival as Countermeasure for AFTA Pressure**

In facing AFTA, the National manufacturer is plagued with the following issues arising from both internal and external factors.

#### **(a) Internal Factors**

- The automotive industry, especially the National manufacturer, is still at an infant stage compared to other world auto players like General Motors, Ford, Toyota, etc. The industry is not fully developed and matured. Hence, the vulnerability towards external changes and competition.
- Uncompetitive domestic market cost and pricing because of the removal of all government tariffs and duties exemption support under AFTA.
- Unfavorable export market cost and pricing.
- Reduction in domestic production volume because of decrease in production demand, as there will be no more advantage on market sales pricing.
- High manufacturing costs from huge capital investment. Return on investment is yet to be achieved.
- Substantial local parts transfer cost to the local vendors as these vendors need to bear the technical assistance technology transfer royalty, parts development cost and foreign exchange exposure for procuring imported main components from the principal manufacturer abroad. In some cases, the National manufacturer needs to subsidize the local parts cost.

#### **(b) External Factors**

- Substantially high exposure to foreign exchange volatility as some main components are imported from overseas (principal manufacturer).
- Competitors may flood the domestic market with better specification vehicle models at more competitive prices as a means to create a strong foothold in the domestic market.

### **Strategies of National Manufacturer in Facing AFTA**

The strategies of the National manufacturer are as follows:

#### **(i) Product**

Under product strategy, the National manufacturer will look into the following:

- Develop more new models and expedite launching of the new model

The objective of such moves is to ensure that all the product lines are readily available to fit into all vehicle utility market segments. Gaining consumer acceptance and confidence in the long run is essential as it may contribute to increased demand and market share. However, the manufacturer must be cautious in launching the new product, as the success of new product introduction is dependent on successful product rollovers as well. For the case of the National manufacturer,

dual product roll, i.e., introducing new ones while keeping the existing product, is a more favorable approach than phasing out the old ones and keeping the new. Therefore, local vendors must keep abreast with current technological advancement in design and prototyping as well as production. Unable to cope with the rate may cause the manufacturer to outsource or procure the parts from OE suppliers (original parts) elsewhere. The vendors are also at risk as the lifecycle of the product is short. Coupled with high capital investment and inadequate volume, it is difficult for the local parts vendors to achieve scale economies.

- Market domination

To ensure consistent market demand flow, a market domination strategy must be adopted. Upon successfully dominating such segment, it will deter other competitors from penetrating into the segment. As such, market entry barriers such as high network set-up cost, after sales service capability and brand acceptance recognition by the consumers will act as deterrence to new players into the segment. Coupled with good second-hand resale value, it may spur consumer confidence of the brand even further, creating good demand and price value for the both the old and new vehicles. Vendors must continuously keep its replacement (RE) parts supplies at affordable prices for the mass consumers at all times. If the RE price is too high, the mass consumers and retailers may source the parts elsewhere where it is cheaper, causing these vendors to lose the opportunity to seize market domination, parallel with the National manufacturer's strategy.

- Speedier and more local content involvement

Under pressure to be more cost competitive, speedier localization program must be continuously coordinated to achieve economies of scale and reduce impact from foreign exchange exposure. Vendors must keep abreast with the best technology in design and prototyping to avoid losing business.

- Be independent in creating new vehicle designs

Upon expiry of the technical assistance agreement with the original principal manufacturer who is the technical partner, National manufacturer has the option to develop its own vehicle design. National manufacturer may utilize a mix variant of components and technology from various component manufacturers to make it more competitive. The competitiveness feature may come from the vehicle design, attractive selling price or low manufacturing costs. Here, the principal manufacturer's vendors can offer their expertise in design and prototyping, and production for National manufacturer with a view of establishing long term relationship. It is therefore feasible and optimum for the National manufacturer to speed-up the technology transfer given the short time to AFTA.

(ii) *Distribution Channel*

The following strategies are adopted to improve its distribution channel.

- Acquire controlling stake in distribution company

With a controlling stake in the distribution channel, the manufacturer is able to better service its consumers as well as understand their needs and requirements more expediently. This will enable the manufacturer to better design and produce vehicles that meet the consumers' needs more competitively and yet giving value

added benefits and keeping cost down. Additionally, the manufacturer's critical activities of forecasting demand, managing parts vendors and inventory, and maintaining price stability can be enhanced with better information and management control. With a controlling stake in the distribution company, the manufacturer's distribution strategy in the marketplace can be managed more effectively and with greater sensitivity and responsiveness to consumer demands, thereby gaining customer loyalty.

- Reduce non-value added costs along distribution channel

With direct supply to the market, the manufacturer, through better management of its distribution channel, is able to cut-off non-value added costs from its distribution and handling process costs. The savings generated from unproductive costs can be substantial if the volume is high. These savings can be better utilized by passing them on to the consumers

(iii) *Production*

To keep costs low, various production processes are examined. They are:

- Adopt both line and contract assembly manufacturing

The manufacturer is now revamping its sole manufacturing line system to make it more open and able to adapt to vehicle contract assembly line as well. With such capability and flexibility, the manufacturer is able to manufacture its own product as well as doing contract assembly production for other franchised holders. With such arrangements, the manufacturer is able to achieve scale economy and consequently, lower manufacturing costs to gain competitiveness upon AFTA. Likewise, parts vendors must have the capacity to cope with the requirement of supplying adequate automotive parts at justifiable cost and quality.

- Adopt "open door" policy in parts sourcing to keep costs down

Under this policy, only parts vendors with "Best price = quality" principle will be accepted by the manufacturer regardless of the duration of the relationship. With the revamp from the traditional sourcing method by National Manufacturer, the single source channel is now replaced with multi-source channel. Under such system, sourcing will be done globally to seek the best price, quality and delivery conditions.

(iv) *Corporate Alliances*

To make Malaysia a domestic and export hub for automotive, forming alliances with global auto players to ride on high production volume is imperative. By forming alliances or joint ventures with giant foreign auto players, national manufacturers can undertake contract assembly work for them, thereby increasing production volume as well as making Malaysia an export hub for these large corporations. Under such arrangements, the national manufacturer can gain speedier economies of scale and recovery of capital investment.

(v) *Distributors*

Expecting intense market competition, most vehicle distributors have opted for the multi-franchised system as their sales and distribution strategy. However, the traditional single-franchised system is still being practiced as the distributors feel it

is viable even after AFTA. As such, more independent after-sales centers are being opened up to cater for multi-brand vehicles rather than single-brand vehicles. Domestic auto players have to ensure these after-sales centers are well equipped with the appropriate distribution network and trained manpower after AFTA.

Similarly, dealers have formed a consortium to ensure that they are financially stronger and bigger in facing the challenges of AFTA. By banding and pooling their finances and networks, they ensure better rate of survival after AFTA. Distributors as well, have adopted a direct to end-user sales approach where they sign corporation-to-corporation agreements for direct purchase of the vehicles with attractive offerings or packages provided. An electronic order system is also in place to support speedier order placements and processing from the customers.

(vi) *End-users*

For end-users, better services are expected upon AFTA as manufacturers/distributors compete intensely with each other to provide superior goods and services. However, the stake of gaining market share and staying competitive remain daunting for the manufacturers/distributors.

### **Nature of Malaysian Domestic Automotive Market**

Compared to Thailand and Indonesia, the Malaysian automotive sector is fairly regulated with high intensity development for the National brand as the OE vehicle manufacturer of:

- Proton and Perodua for the passenger cars (2,000cc and below category)
- HICOM and Inokom for commercial vehicles (Light-duty trucks and buses of GVW 8.0 tons and below) and,
- Modenas for motorcycles (110cc and 250cc only).

With heavy government support and intervention as part of national interest, and huge capital investment put in, National vehicle manufacturer became more cost competitive which subsequently, led to the domination of market share. The national interest may be elaborated as investment for local vendors development which includes raw material sourcing, sub-assemblies operation, job acquisition, technological transfer, returns on huge capital investment and lower foreign currency exposure risk.

In contrast, the Non-national assemblers cum franchised holders such as Toyota, Volvo, Ford, Mercedes, BMW, just to name a few, remain as vehicle assemblers rather than manufacturers, as most of the components are imported directly through CKDs from the origin country such as Japan, Korea, Germany, etc., hence, lesser need to localize the parts in Malaysia. At present, high duties are imposed on these companies for not complying with the Mandatory Deletion Item (MDI) regulation under the Local Content Policy. The MDI regulation is used as a means to support the local parts vendors and compensate the National vehicle manufacturer against the heavy responsibility of developing the nation's automotive industry and supporting the local parts vendors. However, upon AFTA in 2005, the MDI regulation will be abolished favouring intra-ASEAN countries parts source supply. With a maximum tariff of 5 percent imposed, the automotive trade within the ASEAN countries will be enhanced substantially.

Cost reduction can be gained on an in-house or outsourcing basis. For the in-house approach, the production and related processes are being re-studied for further

improvements whilst multi-sourcing is used for the outsourcing approach under the AICO scheme.

In terms of market volume in the Malaysian automotive industry, the Passenger Car category has the largest share, followed by the 4x4 and Commercial Vehicle category (under single product variant basis). The Malaysian automotive industry is expected to reach a sales volume of 380,352 units in the year 2001 or a growth of 11 percent compared to year 2000. Table 1 shows the details.

**Table 1: Details of Vehicle Sales**

<b>Vehicle Segment</b>	<b>Year 1998</b>	<b>Mkt. Grow. 1997/98</b>	<b>Year 1999</b>	<b>Mkt. Grow. 1998/ 99</b>	<b>Year 2000</b>	<b>Mkt. Grow. 1999/ 2000</b>	<b>Year 2001 #1</b>	<b>Mkt. Grow. 2000/ '01</b>
Passenger Car	137,691	+12%	239,647	+74%	282,103	+18%	315,955	+12%
4x4	8,519	-67%	22,725	+168%	27,316	+20%	28,957	+6%
Commercial Vehicle	17,641	-75%	26,171	+48%	33,752	+29%	35,440	+5%
Total Industry Volume	163,851	-60%	288,543	+76%	343,173	+19%	380,352	+11%

*Note : #1 - Based on Malaysian Automotive Association (MAA) forecast.*

### **Market Segmentation Analysis**

#### **Passenger Cars (PC)**

In the PC segment, Proton leads the market, followed by Perodua. The National brand (Proton and Perodua) has around 93 percent market share (see Table 2).

**Table 2: Passenger Car Sales by Manufacturer**

<b>Maker</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
Proton (National)	155,720	178,960	186,200
Perodua (National)	66,499	82,484	85,000
Honda	4,606	4,550	5,720
Toyota	4,556	4,424	5,300
Nissan	2,970	3,939	4,230
Mercedes-Benz	1,163	2,247	2,450
BMW	1,219	2,085	2,500
Others	2,914	3,414	6,850
Total Sales	239,647	282,103	298,250
Total National	222,219 (92.7%)	261,174 (92.6%)	271,200 (91%)
Total Non-national	17,428 (7.2%)	20,929 (7.4%)	27,050 (9%)

Proton and Perodua depend on their sole brand manufacturing. The annual production volume of 200,000 and 85,000 units for Proton and Perodua respectively is

adequate for current domestic demand. However, under a more liberalized AFTA market, with competitive pricing and attractive vehicle models available, consumers may opt for the competitors' models, thereby reducing demand for Proton and Perodua cars.

### *Commercial Vehicles (CV)*

These are the 4x4, vans, pick-up trucks, trucks (light, medium and heavy duty) and buses (short and long haul). In years 2000 and 2001, the National brand has 28-29 percent market share against 71-72 percent share for the Non-nationals. The Non-nationals have made a stronger presence in the CV segment than the PC segment (see Table 3).

**Table 3: Commercial Vehicle Sales by Manufacturer**

<b>Maker</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
Perodua (National) #1	16,092	14,501	15,500
Toyota #1	9,229	14,619	14,980
Nissan #1	6,911	9,745	10,160
HICOM (National) #2	2,545	3,208	3,600
Daihatsu #2	2,365	2,780	2,940
Others	11,748	16,217	20,020
Total Sales	48,890	61,070	67,200
Total National	18,637 (38%)	17,709 (29%)	19,100 (28%)

#1 - Major product line MPV/Van and 4x4; #2 - Major product line Trucks

The overall PC and CV sectors contributed RM 99.1 million (US\$26.1million) to the Malaysian economy in 1999.

### *ASEAN Market Total Vehicle Population*

Indonesia, Thailand and Malaysia, the three main players in the ASEAN automotive industry (also referred to as CKD assembling countries), compete closely with each other for market share. The total vehicle sales volume for the following ASEAN countries is shown in Table 4.

**Table 4: Total Vehicle Sales Volume by Country**

<b>Country</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
Thailand (RHD)	571,580	589,126	363,156	144,065	218,330	262,189
Indonesia (RHD)	378,704	332,035	386,691	58,261	44,000	303,000
Malaysia (RHD)	285,792	364,788	404,837	163,851	288,547	343,173
Philippines (LHD)	128,829	162,001	144,435	80,231	N/A	N/A
Singapore (RHD)	41,704	36,915	34,812	37,493	N/A	N/A
Vietnam (RHD)	7,019	7,881	5,940	5,400	N/A	N/A
TOTAL	1,413,628	1,492,746	1,339,871	489,301	N/A	N/A

RHD – Right Hand Drive vehicle country; LHD – Left Hand Drive vehicle country

Malaysia, Thailand and Indonesia (the three largest vehicle population countries) have a yearly new vehicle registration of between 250,000 to 350,000 vehicles per year. In terms of car ownership ratio, it is noted that South-East Asia has a considerably high ratio of around six people per car.

### **ASEAN Passenger Car and Commercial Vehicle Market Segmentation**

The PC and CV segments form the total automobile population. In ASEAN, Malaysia has the largest PC market peaking in 1997 with just over 300,000 registrations. Since the economic downturn in 1998, registration has dropped by 55 percent. In 2000, the market recovered strongly with a 19 percent growth in sales to 343,173 units. This is a sales pattern similar to that of the western developed markets, reflecting the Malaysian government's priority to its domestic passenger car manufacturers, Proton and Perodua. Tables 5 and 6 show the passenger car and commercial vehicle population for Thailand, Indonesia and Malaysia. For Malaysia, at 60,000 units, commercial vehicles represent 18 percent of the total vehicle sales in 2000 alone, compared to Thailand and Indonesia.

**Table 5: Passenger Car Population**

Country	1997	Market Growth (%)	1998	Market Growth (%)	1999	Market Growth (%)	2000	Market Growth (%)
Thailand (RHD)	132,060	-23.5%	46,300	-65%	66,858	+44.4%	83,106	+24.3%
Indonesia (RHD)	73,215	+66.7%	23,738	-67.6%	9,000	-24.2%	48,000	+433%
Malaysia (RHD)	307,907	+11.7%	137,691	-55.3%	239,647	+74%	282,103	+17.7%

**Table 6: Commercial Vehicle Population**

Country	1997	Market Growth (%)	1998	Market Growth (%)	1999	Market Growth (%)	2000	Market Growth (%)
Thailand (RHD)	231,096	-44.5%	97,765	-57.7%	151,472	+55%	179,083	+18.2%
Indonesia (RHD)	313,476	+8.8%	46,392	-85.2%	35,000	-25%	255,000	+629%
Malaysia (RHD)	97,186	+9.3%	26,161	-73.1%	48,900	+86.9%	61,070	+24.9%

### **ASEAN Country Strategies For AFTA 2005**

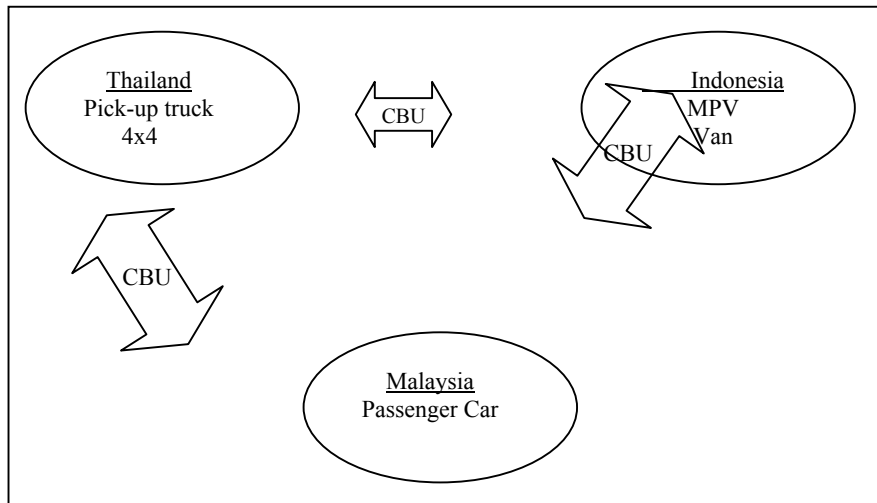
Considering each country's competitive advantage and specialization, the ASEAN countries have adopted various strategies to ensure competitiveness and survival of its automotive industry upon AFTA. Some of these strategies are:

#### **(a) Vehicle base model segmentation**

This segmentation strategy is based on the competitive advantage that a country is able to secure from its largest vehicle type base volume or platform. Strategically, Malaysia has the largest passenger car CBU base volume as most of the passenger cars are assembled here. In Thailand, the competitive advantage is in pick-up trucks and 4x4s as the industry is more advanced in them and enjoys lucrative tariff support from the Thai government. For multi-purpose vans, Indonesia is the specialist as it has a large domestic market volume base. As an example, the Mitsubishi Storm pick-up 4x4 is assembled in

Malaysia with CKD origin from Thailand and the engine and transmission from Japan.

Under AFTA, the principal manufacturer will set-up its production base in the country where it has a competitive advantage and coordinates all production for domestic and AFTA export distribution from there. Figure 3 is a simplified diagram explaining the transaction flow under AFTA.



**Figure 3: Transaction Flows under AFTA**

In general, the products exported by the principal manufacturer from the base country can be in the form of CBUs or CKDs. Whether it is CBUs or CKDs, it depends on that particular country's competitive advantage in terms of resources. These are:

- the country's secondary base and skills that enable the automotive industry to flourish. For example, Thailand is often quoted as having a strong production base for vehicle accessories.
- the country's primary base and skills that enables the automotive industry to flourish. For example, Indonesia is well known for metal parts stamping.
- supporting elements such as manpower skill level and cost, land cost, availability of related machinery domestically, etc.
- technology transfer level which the principal manufacturers (mostly foreign based corporations) have invested into the country and the cost advantage gained on parts localization.

However, not all principal manufacturers adopt similar strategies, as some would prefer a particular country as the production base as they can gain some strategic advantage in their production resources.

*(b) Parts complementation under AICO industrial cooperation program*

Under this scheme, the ASEAN participating countries will complement industrial activities and production output to gain larger production volume base and specialization. With the objective of mainly to gain larger market base, gaining technical assistance cooperation advantage is under consideration as well. Under this scheme, the participating countries/companies will enjoy a preferential tariff rate in the range of 0-5 percent instead of the 20-40 percent, varying from one country to another.



## **CONSTRAINTS FACED BY LOCAL PARTS VENDORS**

The major constraints faced by local parts vendors in competing under the AFTA era are as follows:

- Almost all local parts vendors are small and medium size in nature with turnover of less than RM15 million (US\$ 3.7 million) per company/annum. Hence, limited financial resources needed for expansion set these vendors back. This is further aggravated by the competitive environment, which reduces their profit margins.
- A lack of expertise and equipment facilities in the area of research and design is a setback for the industry. The local parts vendors over the years are too reliant on the National manufacturer for providing designs, drawings and specifications of parts for their production, which discourages them from venturing into research and design, as it is costly in nature.
- Limitation of the domestic market production volume may result in the vendors not being able to achieve economies of scale in their production. The local parts vendors may be penalize with higher manufacturing costs and uncompetitive parts price.
- Considerably high cost of capital from the local banks. The present cost of capital charged by banks is between 9 percent and 11 percent. Even with government funding to ease the burden of the local SMEs, interest rates may drop to 5 – 6 percent but funds availability is still limited. With the after effect of the Asian financial crisis in 1997/98, most vendors are still recovering from the crisis, which drained their cash flow position.
- Most vendors are also facing over investment in their production capacity. The over expansion of machineries and production facilities resulted in unnecessary investment causing the facilities to be idle due to either no or less order received, and parts not required at all. Difficulties in changing the machineries set-up and production line also cause it to be idle.
- Because of the Asian financial crisis, raw materials are procured and imported at a higher price. The price rise of between 20 percent and 50 percent from the original or imported source (mostly Japan) is a result of high foreign exchange exposure. Even today, the foreign exchange rates have yet to normalize to the early 1997 level. High foreign exchange factor has caused the procured parts cost to surge substantially.
- In venturing into other countries or market, vendors are faced with entry barriers. For the automotive industry, the principal manufacturer, as the technical partner to the local parts vendor, has created a worldwide cartel creating a barrier to entry in the market. This barrier may be in the form of limited access into technical assistance granted, licensed manufacturer based on geographical territory basis or refusal to support or supply the critical component of the parts item.

## **CONCLUSION**

In view of AFTA and globalization, market forces will dictate the corporation or industry's strategy. These forces will cause structural change in the industry forcing corporations to shift and move in tandem with such changes. The transformation of such changes and strategic countermeasure effect however, is yet to be fully evident until after the AFTA implementation. However, what is evident is that under stiff competition, operating profits will drop, speed of product development will accelerate, and product life span be shortened.

To face the challenge, the local parts vendors are forced to undertake the following countermeasures:

- They must be more cost and operationally competitive. A lean operation and yet productive structure must be implemented.
- New capital investment and production capacity must be weighed accurately to ensure such investment will not burden them in the long run.
- They must be more resourceful in expanding the market coverage by not limiting themselves to Malaysia only but also venture to regional markets like Indonesia and Thailand.
- Form strategic alliances with neighboring countries' vendors to maximize opportunities.

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## INTRODUCTION

Supply chain management (SCM) is a new concept even for the advanced and the developed countries of the world. They are now just starting to know the importance of supply chain management. In an increasingly fast paced and competitive world of today, success of an enterprise depends not only in the quality of the product but also on the creation of an efficient management of the supply chain system. This is becoming more and more critical in all round efficiency of an enterprise and to meet demand of customers, who are more informed and sophisticated resulting in less and less lead time for delivery because of fast paced changes in technology.

Nepal is one of the least developed countries of the world with per capita income of US\$120. Agriculture dominates the economy with more than 80 percent of the total population engaged in this sector. Manufacturing industry is still at rudimentary stage with only about two percent of the economically active population involved in this sector. Because of this weak economic and rudimentary industrial structure, development of SCM compared to other countries, especially those in developed countries will take many years to materialize in Nepal.

## CURRENT STATUS AND ISSUES OF SMEs IN NEPAL

SMEs have a major share in terms of total number of industrial enterprises, employment and output in the overall industrial scenario of Nepal. The importance of SMEs will grow in the future as Nepal strives for modernization and industrialization. In 1997, the Government amended the industrial policy of 1992, categorizing industries with fixed investment up to Rs. 30 million as small industries and fixed investment between Rs. 30 million and Rs. 100 million as medium industries. Fixed investment of more than Rs. 100 million are categorized as large industries. Previously fixed investment up to only 10 million was considered small industries and fixed investment between Rs. 10 million and 50 million was considered medium industries while fixed investment of more than Rs. 50 million was considered large industries. This means more industries have now come under small and medium category and its importance has increased. Almost all of the so-called large industries of Nepal fall into small enterprise category when compared with neighboring and other developed countries of the world. This is because the economic base of the country is very small. Comparatively, industrial enterprise development is still at its infant stage compared to other countries of the world.

SMEs account for 99 percent of the total industrial establishment in the country. SMEs provide job opportunities to 498 thousand people, accounting for more than 90

percent of the employment opportunity in the total industrial sector. SMEs account for 41 percent of the total fixed capital outlay of the industry sector. The export manufactured goods accounted for more than 80 percent of the total export and SMEs share to GDP is 9.22 percent.

The Central Bureau of Statistics, National Planning Commission carries out manufacturing census every five years. Status of Small and Medium Manufacturing Industries compared to the whole manufacturing industry of the country is compiled from the 1996/97 Manufacturing Census. Recent statistics on manufacturing is unavailable because the Bureau of Statistic, National Planning Commission has just finished Census 2000/2001. It will take some time before the recent census is published. The compilation of data from Manufacturing Establishment Census 1996/97 will give us some information on status of Small and Medium Manufacturing Enterprises in Nepal.

Since the amendment of the industrial policy was made in 1997, the categorization of Small, Medium and Large manufacturing enterprises are done on the basis of the non-amended industrial policy of the Industrial Enterprise Act 1992. Therefore, because of difficulty in adjusting the data at this stage, fixed asset investment of up to Rs.10 million and between Rs.10 million and Rs.50 million is still treated as Small and Medium Enterprises even though fixed investment of up to Rs.30 million and between Rs.30 million and Rs.100 million has been categorized by HMG as falling under Small and Medium Industries. The compiled data of Manufacturing Census 1991/92 depicting status of Small and Medium Manufacturing Enterprises is given below.

**Table 1: Status of Small and Medium Manufacturing Enterprises, 1991/92 ('000 Rs)**

Type	No. of establishments	Persons engaged	Fixed assets	Census input	Census output	Census value added
Small	4,083	185,510	3,493,770	11,645,959	19,498,149	7,852,190
Medium	136	18,904	2,767,124	4,099,087	6,238,006	2,138,919
Small & Medium	4,219	204,414	6,260,894	15,745,046	25,736,155	9,991,109
Total	4,271	223,463	20,067,126	19,347,452	32,997,374	13,649,922
Percent of SMEs to Total	98.8	91.5	31.2	60	78	73.2

*Source: Compiled from Census of Manufacturing Establishments 1991/92, Central Bureau of Statistics, National Planning Commission*

Table 1 indicates the importance of small and medium manufacturing enterprises in Nepal. In 1991/92, about 98.8 percent of the manufacturing enterprises were in the small and medium category. Out of 223.5 thousand persons engaged in the overall manufacturing sector, 91.5 percent were engaged in SMEs. SMEs here cover 78 percent of output and 73.2 percent of value added. In spite of these significant contributions of SMEs, SMEs account for only 31.2 percent of fixed asset investment. The compiled data of Manufacturing Census 1996/97 depicting status of Small and Medium Manufacturing Enterprises is given in Table 2.

Table 2 shows only a slight change from the period 1991/92. The number of SME establishments has gone down from 4,219 to 3,485 in 1996/97. SMEs accounted for 97.9 percent of the total manufacturing establishment of Nepal in 1996/97. Similarly, SMEs accounted for about 67 percent of output and 64 percent of value added of the total

manufacturing sector. In spite of these contributions from SMEs, SMEs accounted for only about 40 percent of the fixed asset investment of the total fixed asset investment in the manufacturing sector.

**Table 2: Status of Small and Medium Manufacturing Enterprises, 1996/97 ('000 Rs)**

Type	No. of establishment	Persons engaged	Fixed assets	Census input	Census output	Census value added
Small	3,203	130,932	4,572,111	12,579,795	19,928,782	7,348,987
Medium	282	40,554	6,058,302	10,320,211	16,871,890	6,551,679
Small & Medium	3,485	171,486	10,630,413	22,900,006	36,800,672	13,900,666
Total	3,557	196,708	26,491,045	33,051,777	54,927,092	21,875,315
Percent of SMEs to Total	97.9	87.2	40.1	69.3	66.9	63.5

*Source: Compiled from Census of Manufacturing Establishments 1996/97, Central Bureau of Statistics, National Planning Commission*

So far, out of the total registered small and medium industries, about 50 percent of them are believed to be non-operational and more than 60 percent of the operating industries are characterized by under capacity utilization and sickness.

## **BARRIERS FOR DEVELOPMENT OF SCM IN SMEs IN NEPAL**

Development and promotion of SMEs involve many issues such as entrepreneurship development to appropriate institutional support to adequate government policy to productivity improvement. The combinations of all these have profound influence. In the Nepalese context, all the important components necessary for the development of SMEs are very weak which makes it very difficult for enterprises to develop sound supply chain mechanism to boost their efficiency and performance. Some of the major barriers for development of SCM in Nepal are given below:

### **Geography, Natural Resources and Infrastructure**

Nepal is a small landlocked mountainous country with about 83 percent of its land covered by mountains and hills, and only 17 percent of land covered by plain Terai land. Because of the mountainous topography of the country, cost of constructing roads in Nepal is very expensive. Added to the mountainous topography and landlocked nature is the weak economic situation of the country. As a result, not all parts of the country is linked with roads, making transportation costly both internally as well as externally. To solve this problem to a certain extent, the government recently constructed Inland Container Depots (ICDs) at three leading market centers (Birgunj, Biratnagar and Bhairahawa), connecting to the Indian border and ports from where goods get shipped to third countries. Government of Nepal is also thinking of establishing export-processing zones near these areas to facilitate export-oriented industries to become more effective and productive and reduce cost of production to compete in the international market. These are some of the activities of the government through which SCM system can be improved in the country.

Except for the potential to harness electricity (second highest potential in the world after Brazil), Nepal does not have much natural resources of its own, making it necessary to import these resources from other countries. As mentioned before, because of the weak economic resources available in the country, almost the entire infrastructure necessary for efficient functioning of industries, including SMEs, is inadequate. This is highlighted by the fact that only about 10 percent of the total population has access to electricity. Water supply is also not adequate. In fact, even with abundant water available in the country, electricity price is considered one of the highest in the world. Similarly, less than two percent of Nepalese own a telephone in Nepal. Without the availability of these basic requirements, the development of SCM cannot really take off in Nepal.

### **Economies of Scale**

Nepal is a small country with about 20 million people and a per capita income of US\$120. As a result, the economic base of the country is very small and therefore Nepal does not have the advantage that some of the neighboring countries of Nepal have. Even the so-called large industries of Nepal fall under small category and the SMEs of Nepal are very small when compared with international standard. Therefore, most of the industries of Nepal are very small with hardly any resources left for either R&D or to develop SCM to increase their efficiency and productivity.

### **Government Policies, Rules and Regulation**

Nepal, after the dawn of democracy, has been pursuing more liberal, open and market oriented policies with the aim to improve its competitiveness in the international arena. Since 1990, Nepal has introduced new industrial and trade policies and government is now playing more of a regulatory and supporting role, while most of the economic activities have been left to the private sector. Since the 1990's, the government has more or less de-licensed all industrial activities as well as de-controlled prices and investment, leaving it to open market forces. In spite of these attempts by the government, implementation of rules, regulation and issues such as patent rights and settlement of trade disputes are very poor in Nepal. Nepal is not a member of WTO, at present. These are also affecting Nepal's performance and its ability to be competitive in the international market resulting in weakening of the development of SCM.

### **Current Political Situation**

After the dawn of democracy in 1990, the political situation in the country has been more or less unstable at best with no party having had chance to form a full term government. The problem of Maoist, which had started affecting the country since six years back, has heightened with the government having to declare a state of emergency in the country. The government took this step to fight back the challenges posed by the sporadic attacks made by the Maoist all over the country after the Maoist abruptly cancelled dialogue that had been going on for the past four months. This affected the industry and supply chains in Nepal negatively.

### **Government Institution Support**

There are various government institutions involved in supporting SMEs in the country. Some of the government departments that are involved in industrial development activities are Department of Small and Cottage Industries, Cottage and Small Industry Development Board, Department of Industry, Trade Promotion Center, Industrial

Enterprise Development Institutes, National Productivity and Economic Development Center and so on. Some of these are described in brief below:

The Department of Cottage and Small Industries and Cottage and Small Industry Development Board were re-structured in 1992. Department of Cottage and Small Industries covers 27 districts of Terai and hills of the country. Similarly, Cottage and Industry Development Board, looks after 48 districts of hills. Both of these institutions are involved with registering cottage and small industries of various districts of Nepal. These institutions also give advice and prepare feasibility schemes on possible small-scale industries that can be launched by small entrepreneurs in the country. About 6,000 and 8,000 people were given various skills development training by Department of Cottage and Small Industries and by Cottage and Small Industries Development Committee in 1997/98, covering all 75 districts of the country. These activities of the institutions, by many accounts, are not considered adequate, considering the needs of the country.

The Small Business Promotion Project was launched in Financial Year 1982/83 with the objective of entrepreneurship development and small business promotion in Nepal. This project was replaced by Industrial Business Development Center in 1995/96. This center was renamed as Industrial Enterprise Development Institute (IEDI) in 1996. The institute, in 1999/2000, provided entrepreneurship development training to 469 persons and business promotion trainer's training to 104 persons. IEDI conducted about 92 entrepreneurship development programs in the year 2000-2001, covering six districts in 2000/2001. The six districts covered are Kathmandu, Pokhara, Narayanghat, Butwal, Itahari, and Nepalgunj. Besides skills development training, other supports and activities of the institution are the preparation of feasibility schemes for small enterprises, conducting studies, seminars and meeting, and relating to enterprise development in the country.

The National Productivity and Economic Development Center (NPEDC) is currently involved in industrial research, consultancy and training. NPEDC also functions as a secretariat of National Productivity Council dealing with the formulation of national productivity policies and issues in the country. Due to the lack of funds and clear-cut government policies, NPEDC has not been able to play a greater role in the development and support of SMEs to develop appropriate SCM systems in the country.

Considering the various supports provided by the government sector are not enough. The quality of skills development training and other supports provided by most of these government institutes are generally considered poor because of the lack of proper infrastructure, equipment, human resources and funds.

## **STATUS AND USE OF IT IN NEPAL**

For the past few years, IT has begun penetrating into Nepal. The use of Internet, mostly in city area and especially in Katmandu, has already revolutionized the way people do their work. However, use of IT in SMEs compared to the developed countries of the world, is still insignificant in Nepal. Only about 0.5 percent of the total population of the country own computers<sup>2</sup>

In an emerging knowledge based economy, sustainable competitive advantage of a country depends not only in having natural resources or cheap labor force but also on its ability to harness intellectual assets. In addition, the knowledge industry offers a unique

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<sup>2</sup> *The Kathmandu Post, November 30, 2001*

chance to leap frog the entire stage of development. Nepal can benefit a lot from this IT industry not only from the point of view of income and employment generation but also through promotion of exports, tourism and other services. The foremost challenge for Nepal at present is accessing this relatively cheap flow of information to the whole country and especially for the SMEs, without which SCM development and implementation will not be possible.

Some of the export oriented enterprises of the country have already benefited from the use of IT but the vast majority of the SMEs still have not been able to take advantage of the IT revolution. The potential of IT to enhance export drive of SMEs is huge.

Even though information technology and the use of Internet is a recent phenomenon in Nepal, IT has already made some headway in positioning itself as a potential component in the mainstream economy and some groundwork has been achieved in this area. Actual statistics on the application of IT in general is very scarce including the application of IT in SMEs. The application of IT has been particularly slow up until the late 1980s. It is only in recent years that remarkable progress is made in terms of awareness and application of IT resources in a number of activities. However IT application in Nepal, as a whole, is not satisfactory and will still take decades of time owing to poverty and meager existence of the Nepalese people. The pace of IT application in education, government and government enterprises is very slow but the use of IT is growing. Banks, financial institutions, private businesses, NGO's and INGO's are taking the lead in the use of IT resources compared to other sectors. Use of IT in SMEs, on the other hand have been slow.

There has been drastic increase in the use of personal computers after 1992 and the use of Internet has similarly increased with the emergence of Internet Service Providers. At present, there are 23 licensed Internet Service Providers and 7 V-SAT private operators in Nepal<sup>3</sup>.

The two key factors in IT development are human resource development and adequate telecommunication infrastructure. Nepal already provides telephone services to 1,726 VDC out of the total of 3,913. This means NTC has already met about 50 percent of demand for telephone services and it plans to cover all the VDCs within 2 years time.<sup>4</sup> Human resource development in the IT sector on the other hand is far behind other countries including our neighboring country India. Government however intends to train about 50 thousand people in the IT sector within a three-year period.

IT development in general and e-commerce in particular requires basic communication infrastructure from the government. At present, only the Internet market is booming in Nepal. It is estimated that there are 10,000 Internet users, at present, mostly in the Katmandu Valley. About 9 districts have access to Internet. With the right policies and environment, most of the 75 districts could have access to Internet in the near future. It will take some time for e-commerce to develop provided government takes active part through appropriate policy measures to penetrate use of Internet in all parts of the country at affordable prices. SCM can be developed if other aspects of Internet such as online payment mechanism, e-payment and e-delivery mechanisms can be implemented properly.

The IT Policy 2000 has already been endorsed. The cyber law has already been drafted and is awaiting ratification from the Parliament. The cyber law deals with issues on successful e-commerce implementation. If the IT Policy 2000 and cyber laws are properly enforced, it will be a milestone in introducing IT in the mainstream of the

<sup>3</sup> *Economic Survey, 2000/01, Ministry of Finance*

<sup>4</sup> *Economic Survey 2000/01, Ministry of Finance*



national economy with potentially huge benefits for the SMEs. The government apart from deregulating the IT sector has also started constructing an IT Park some 20 km away from Katmandu at Banepa, to make internet more accessible to the larger population of the country. The Park, when completed, is expected to develop SMEs engaged in the IT sector as well as make Internet facility broader. These activities are expected to foster greater SCM activities in the country.

## **CONCLUSION**

The challenges for the SMEs are more profound today than in the past especially in the wake of globalization and the emergence of WTO. This is forcing enterprises small and big to be more efficient and competitive. Development of SCM should be perceived as an important part in the overall development of SMEs in Nepal. At present, only very few large companies and joint companies have been able to apply SCM practices and have strategic alliances both inside as well as outside the country for the supply of raw materials, packing materials and for marketing their products with their parent companies and subsidiary companies in Nepal. In a country like Nepal, the development of SCM practices in SMEs will still take many years to materialize and will require joint efforts and commitment from both the government and the private sectors. Towards this end, the government should also encourage and facilitate the use of IT as well as e-commerce to improve the efficiency and competitiveness of SMEs in Nepal.

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# **PHILIPPINES (1)**

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## **INTRODUCTION**

This paper presents the supply chain management (SCM) for SMEs as applied to the mango agribusiness in the Philippines. Mango is an important domestic and export commodity widely grown in the Philippines. SCM in the mango industry was selected as small and medium scale producers and marketers dominate the market. Very few large and multinational corporations, primarily engaged in the exports of banana and pineapple, are involved in mango exports.

This report describes the mango agribusiness as the product flows through the various subsystems. It also attempts to describe the related critical success factors, lessons learned, impact of the SCM on SME sector, current SCM development efforts in country or industry, strategies used and success of implementation, and institutional barriers. SCM will be discussed as applied to the agribusiness framework covering the input subsystem, farm production subsystem, processing subsystem and marketing subsystem to meet market requirements of both the domestic and export markets. The supply chain concept of managing materials supply is relatively new in the Philippines especially in the agribusiness industry.

## **METHODOLOGY**

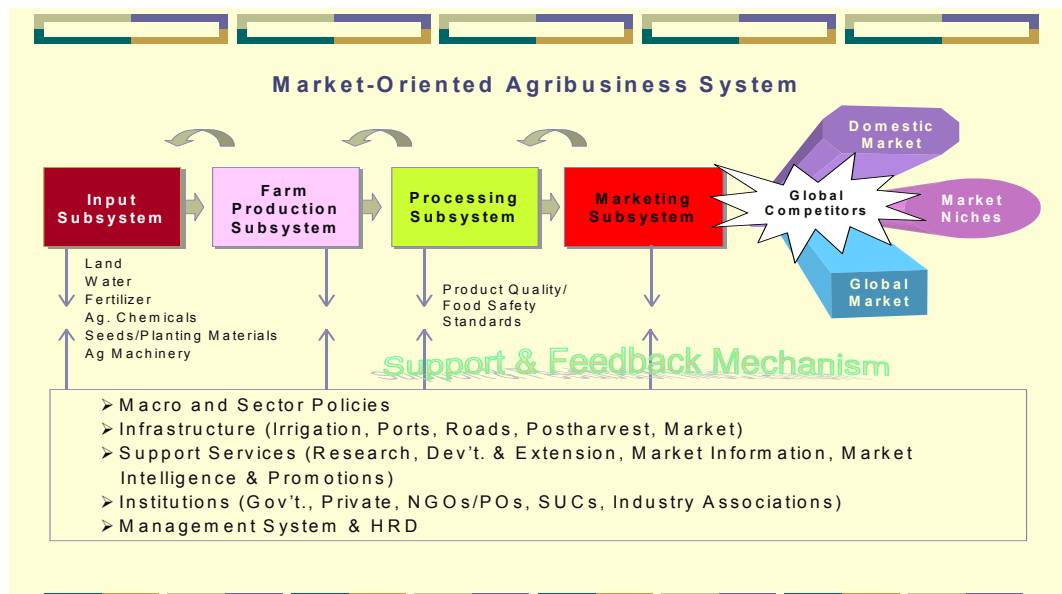
This report is based on secondary data, marketing studies and interviews of key informants in the mango industry. The available statistics and information are discussed based on the agribusiness framework (Figure 1) to trace the product flow through the supply chain. World statistics were obtained from FAO, while the Philippines statistics were obtained from the Philippines National Statistics Office (NSO) and the Philippines Department of Agriculture (DA), Bureau of Agricultural Statistics (BAS).

No research has been conducted on SCM for SMEs in the Philippines and its applications to the agribusiness industry. Thus, this report is primarily based on secondary information and the author's knowledge and direct experience in the mango agribusiness.

## **DISCUSSION**

This section describes the supply chain management and coordination of the mango industry through the subsystems of input, production, post harvest/processing and marketing. The discussion will highlight the aspects and activities critical to the cost-efficient delivery of the product to the customer.

The Philippines, being an archipelago, faces more difficulties in supply management and logistics support as well as handling and transport. For instance, Figure 2 shows the geographical flow of fresh Carabao mangoes from the major supply areas to the major domestic demand areas as well as the foreign markets.



Source: Foundation for Resource Linkage and Development, Inc. (FRLD) - MIPS, 2000

**Figure 1: Agribusiness Framework**

**Input Subsystem:** This subsystem covers land, inputs including genetic materials, fertilizer and chemicals, and labor. Government regulations may be facilitative or disruptive.

- **Planting Materials**

The government through the Bureau of Plant Industry (BPI) implements an accreditation system to ensure that nurseries are selling high quality and recommend planting materials to growers. This system facilitates the farmers' access to high quality genetic materials.

- **Flower Inducer**

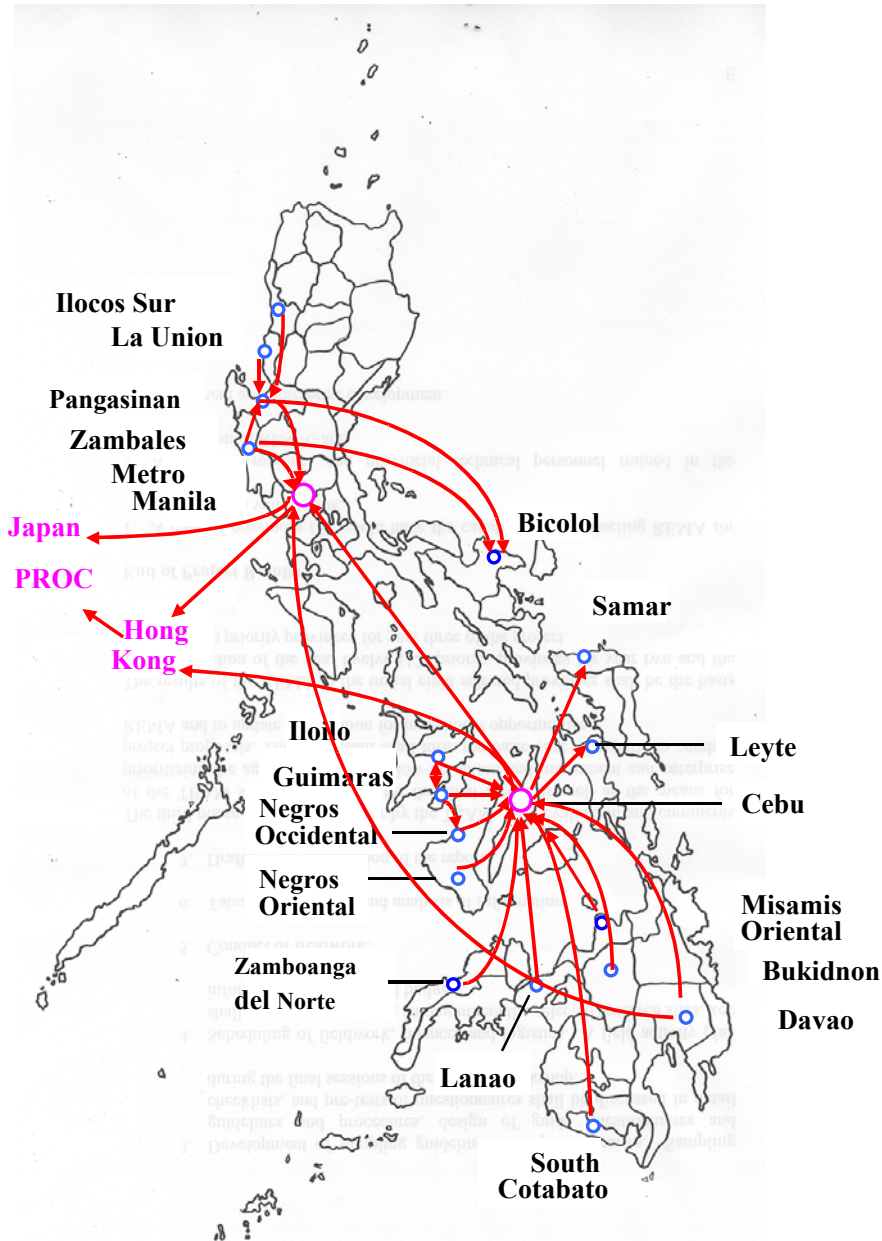
The critical input in mango production is the chemical flower inducer, the import of which is subject to approval by the Philippines National Police (as it is an explosive material), and the Fertilizer and Pesticide Authority (FPA). Growers and sprayers complain about delays in import approval and the tedious documentation on the actual usage by many individual users scattered all over the country. Thus, growers have to incur high costs due mainly to high transaction costs.

### **Farm Production Subsystem**

- Atomistic and seasonal mango production pose big challenges and costs in assembly and transport
- Small to medium size farms are more manageable than plantation scale in terms of labor for fruit wrapping and harvesting

Mango production is concentrated in the Luzon provinces. It is highly seasonal with a narrow window during the months of March, April and May. Production in the Mindanao provinces is largely year-round and peak production is counter seasonal to the Luzon crop. Manila is the largest demand center and is a major transshipment point for

fresh mango exports to Hong Kong and Japan. Three of the Vapor Heat Treatment (VHT) facilities are in Manila, with one recently transferred to Davao in the Mindanao Islands in the Southern Philippines. Cebu, an island province in the center of the Philippines archipelago, is a demand center for processing into puree and dried forms.



**Figure 2: Geographical Flow of Fresh *Carabao* Mangoes from Major Supply Areas to Major Philippines Demand Areas and Foreign Markets**

## Production

Philippines mango production posted an increasing growth rate of slightly over three percent per annum between 1996 and 2000 (Table 1). Two provinces in Luzon, namely, Pangasinan and Batangas, accounted for almost 48 percent of total production (Figure 3). The majority of the top ten provinces are located in Luzon where the peak production period is during the months of March, April and May.

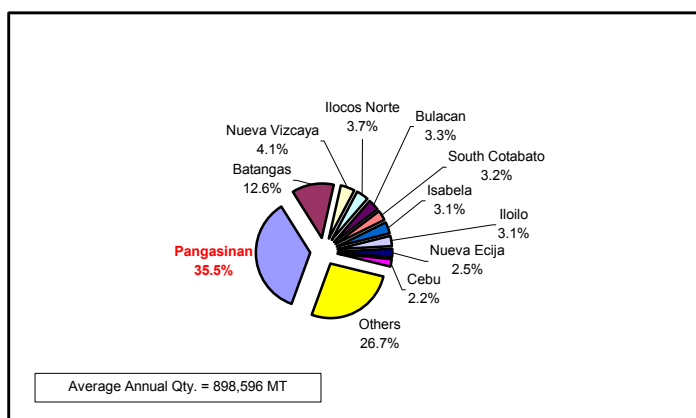
The spraying operations to induce flowering is usually done by growers themselves or by sprayers or sprayers-contractors who oversee the spraying operations or the entire farm operations, including harvesting. The sharing arrangement between the grower and sprayer/sprayer-contractor is agreed upon before flower induction, with the sprayer/sprayer-contractor assuming ownership of the produce.

**Table 1: Mango Production: Annual Quantity, Area and Yield  
1996-2000**

	1996	1997	1998	1999	2000	Average	Rate
Area	117	125	130	132	134	127.66	3.36
Quantity	787	990	994	866	855	899	3.02
Yield	6.70	8.00	8.00	7.00	6.00	7	(1.86)

## Yield

The Philippines national average yield of about 7 metric tons per hectare is comparable with other countries. Pangasinan Province, the top mango producer, registered the highest yield of 21.2 metric tons per hectare during the period 1996-2000 (Figure 4). Most of the top ten producers posted average yields of between 9 and 15 metric tons per hectare. The lowest yield registered during the period is about 2 metric tons per hectare.

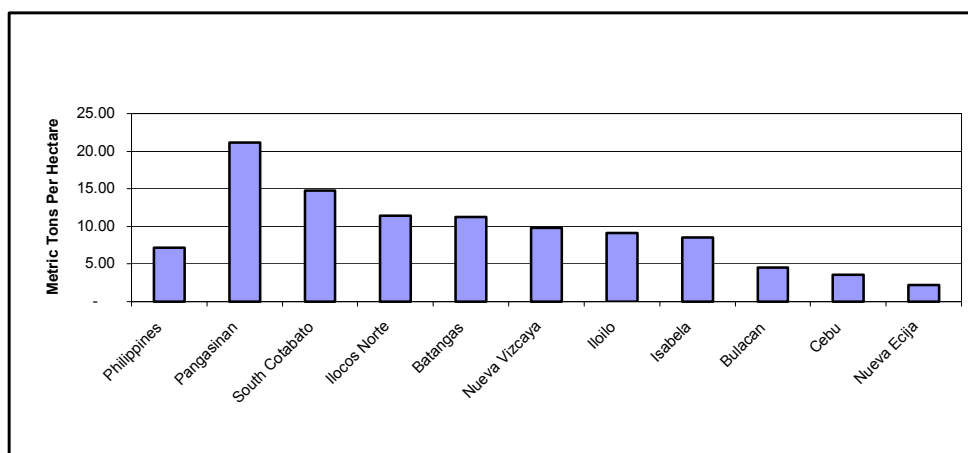


**Figure 3: Fresh Mangoes, Average Annual Quantity by Province, 1996-2000**

## Production Concerns

The following are some concerns with regard to production of mangoes:

- Unstable, low yields
- Delayed and high costs of inputs
- Limited/High cost of money/capital
- Incidence of diseases



**Figure 4: Fresh Mangoes Average Annual Yield by Province, 1996-2000**

### *Types of Growers/Farms*

A study of the Mango marketing system in major production and demand areas in the Philippines was conducted in 1993 (FRLD, 1994) covering 494 farms (see Table 2).

**Table 2: Number of Growers Interviewed by Type of Farm and Province, 1993**

Province/ Municipality	Type of Farm							
	Backyard		Commercial		Corporation		All Farms	
	No.	%	No.	%	No.	%	No.	%
Pangasinan	44	54	37	46	-	-	81	16
Zambales	64	56	49	43	1	1	114	23
Bulacan	37	51	35	48	1	1	73	15
Batangas	27	38	44	61	1	1	72	15
Guimaras	25	58	13	30	5	12	43	9
Cebu	31	69	13	29	1	2	45	9
Davao City	12	36	20	61	1	3	33	7
Davao del Sur	11	33	22	67	-	-	33	7
Total	251	51	233	47	10	2	494	100

Source: Foundation for Resource Linkage and Development, Inc. (FRLD), 1994

Of the total number of farms covered in the supply areas, slightly more than half were classified as backyard growers who owned mango farms with five to 20 bearing trees. This type of growers has limited financial resources. It is common for them to intercrop mangoes with other crops, especially grain.

On the other hand, commercial growers (47 percent of the study samples) are usually professionals and entrepreneurs who are based in the urban center of the municipality and away from the location of the farm. They often delegate the production and postproduction activities to tenants or sprayers/sprayer-contractors who are given a percentage of the income based on the sharing agreement.

There are a few orchard growers classified as corporations. These corporate farms either have integrated production and processing operations, or export their produce to foreign markets through their marketing arms in Manila. Others may even be involved in production, processing and/or export of other fruits or industrial crops.

## Post Harvest/Processing Subsystem

### Harvesting

Mango growers and traders conduct harvesting operations in the morning when the temperature is cooler. Harvesters climb the trees and use bamboo poles with a hook and a net at the end to catch the fruits. The fruits are layered with the end down to let the latex drop on the newspaper lining to avoid any latex stain.

### Sorting and Grading

Traders procure mangoes by tree and conduct sorting, grading mainly by size, weight, and color through ocular inspection or handling. For export, a grading standard set by the Bureau of Product Standards is applied to the Philippines “*Carabao*” variety that is accepted and known in the export markets (see Table 3).

Product quality starts in the production period until it reaches the consumer. A 1994 marketing study conducted by the FRLD presented the following major forms of rejects as reported by traders interviewed. The rejects could be in any one of the following forms:

1. undersized
2. slightly blemished
3. bruised
4. compressed
5. deformed
6. “balat kawayan” (or “peel” appearance, just like that of bamboo)
7. insect damaged
8. slightly infected
9. overripe
10. with cuts/cracked
11. shriveled

**Table 3: Size Classification of “*Carabao*” Mango Set by Bureau of Product Standards**

Size classification	Weight (gm) per fruit	Pieces per carton			
		2.5 kg	5 kg.	10 kg.	12 kg.
Extra large (XL)	357 or more	6-7	12-14	24-28	30-32
Large (L)	290-356	8	16	32	41-43
Medium (M)	241-289	10	20	40	44-50
Small (S)	190-240	12	24	48	51-63
Super small (SS)	160-189	14-16	28-32	56-64	64-75
“Bioco”	Maximum of 85 gm/pc				

Source: Department of Trade and Industry, 1993.

Some of the damage occur during the production period while others, such as compression damage, bruises and cuts, are caused by poor handling, transport facilities and infrastructure. Damages due to insects and diseases are not evident when fruits are still green but manifest when the fruits are fully ripened.

## Marketing Subsystem

### Export Market

- Fresh mango: Strict quarantine protocols of export markets increase product costs e.g. Japan and South Korea which limit volumes and demand higher quality and lower prices
- Hong Kong with no quarantine restrictions has a lower market price but absorbs higher volumes

### Volume

#### *All Product Forms:*

Philippine mango export volumes of all product forms increased at a sluggish growth rate of 0.05 percent per annum between 1996 and 2000 (Table 4). Hong Kong, which absorbed 72 percent of exports, sustained a 2 percent annual growth. In contrast, the second and third largest Philippine mango importers, Japan and the United States, registered negative growth at about 4 and 13 percent per annum, respectively. New markets such as the Netherlands and South Korea have posted high growth rates. Likewise, the China market also grew with direct imports, in addition to volumes transshipped through Hong Kong.

**Table 4: Mango Exports: All Products, Quantity by Country, 1996-2000**

Country	Growth Rate (%)	Percentage Share
<b>TOTAL</b>	<b>0.05</b>	<b>100.00</b>
<b>Total Top Ten</b>	<b>(0.03)</b>	<b>98.04</b>
Hong Kong	2.04	71.93
Japan	(3.84)	18.33
United States	(13.02)	3.29
Singapore	9.73	0.92
New Zealand	(8.38)	0.77
Canada	28.54	0.63
Malaysia	(10.74)	0.59
Netherlands	249.84	0.56
China	619.37	0.55
South Korea	580.11	0.46
Others	6.15	1.96

*Source: National Statistics Office*

#### *Specific Product Forms:*

Fresh mango continues to be the main export, accounting for 88 percent of total mango exports between 1996 and 2000 (Table 5). The volume of all product forms, except mango puree and mango in brine, posted positive growth rates in the same period. All other forms posted export expansion, with mango concentrates and mango preserves as posting the highest growth rates.

### Value

Of the total average, export earnings of \$48 million in 1996-2000, fresh mango



accounts for 78 percent (see Table 5). Dried mangoes are a poor second at 10 percent. The combined shares of other products, namely, puree, juice, frozen, concentrates, in brine and preserves, is only 12 percent.

**Table 5: Mango Exports: All Products, Quantity and Value by Product Type**

Product Type	Quantity		Value	
	Growth Rate (%)	% Share	Growth Rate (%)	% Share
All Products	0.05	100.00	(3.32)	100.00
Fresh mangoes	1.39	87.50	(2.86)	78.31
Dried mangoes	3.80	3.40	5.23	9.67
Mango puree	(20.43)	5.70	(22.44)	6.37
Mango juice	9.27	1.48	3.09	3.65
Frozen mangoes	3,167.36	1.24	5.47	1.65
Mango concentrates	11.55	0.64	366.77	0.27
Edible parts	64.93	0.04	36.31	0.08
Mango in brine	(100.00)	< 0.1	(100.00)	< 0.01
Mango preserves	485.02	< 0.1	229.13	< 0.01

Source: National Statistics Office

The export values of fresh mangoes, mango puree and mango in brine declined during the same period. In contrast, remarkable growth rates of export earnings were posted for concentrates, preserves, and other edible parts, while modest growth were achieved in frozen, dried and juice. The export values of all mango product forms posted declining growth rates in major traditional markets such as Hong Kong, Japan, and the United States (Table 6).

**Table 6: Mango Exports: All Products, Value by Country, 1996-2000**

Country	Growth Rate (%)	% Share
TOTAL	(3.32)	100.00
Total Top Ten	(3.35)	96.91
Hong Kong	(3.60)	52.64
Japan	(4.23)	31.69
United States	(4.95)	5.14
Singapore	4.28	1.54
German Federation	14.31	1.54
Canada	13.78	1.27
New Zealand	(13.25)	0.89
Netherlands	143.18	0.80
Malaysia	(5.46)	0.70
South Korea	1,030.94	0.68
Others	8.20	3.09

Source: National Statistics Office

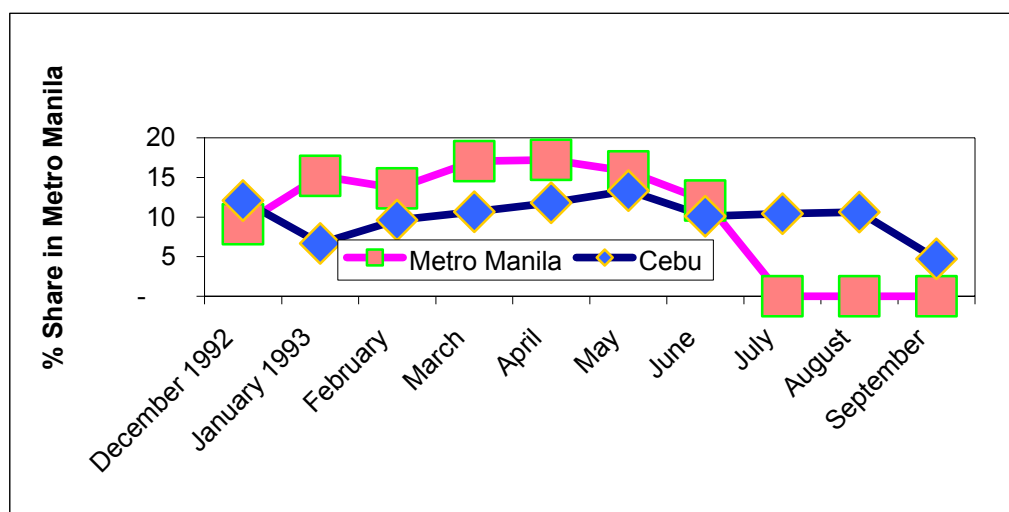
### Marketing Channels

The following are used for the market channels and distribution in the supply chain

of mangoes:

- The key demand/transshipment centers are Metro Manila and Cebu for fresh and process mangoes
- Buyers for fresh and process mangoes for domestic and export markets source bulk of their supplies from wholesalers and other traders
- Product differentiation and market segmentation are practiced.

The FRLD study in 1993 showed that Metro Manila traders had the highest quantity of fresh mangoes traded through at least seven large trading centers. Cebu traders ranked second in quantity traded. Metro Manila and Cebu are not only key demand centers for fresh mangoes for domestic market, but also key transshipment centers as well for fresh mangoes for exports. Figure 5 shows that the key trading months in Metro Manila are January to June, with shares of quantity traded ranging from 12 to 17 percent. On the other hand, Cebu trading is active for a longer period of December to July, except for the sharp drop in January. The share of quantity traded ranged from 10 to 12 percent.



**Figure 5: 'Carabao' Mangoes Trading by Retailers in Selected Demand Centers: Average Monthly Quantity, 1993**

Figure 6 illustrates the various channels through which the mangoes are marketed from Pangasinan, the top-producing province, to buyers within the province (11 percent), Metro Manila (57 percent) and exporters in Metro Manila (28 percent). From the growers, the bulk of the supply goes to the wholesalers (64 percent), with the rest going to the exporters/traders buying stations (15 percent), contract-buyers (10 percent), sprayer-traders (3 percent), and wholesaler-retailers (6 percent) and retailers/supermarkets (2 percent). The numerous layers show the difficulty in managing the supply chain. The exporters' buying stations and retailers/supermarkets employ direct procurement and management of supplies. In addition to its supplies through the buying stations, the exporters also source from wholesalers who may procure from growers and sprayer-traders. Exporters to Hong Kong also supply exporters to Japan high quality mangoes that need to undergo vapor heat treatment (VHT). In contrast, the mangoes in Cebu are

mostly absorbed by processors (73 percent), followed by wholesaler-retailers (16 percent), direct consumers (2 percent), wholesalers to exporters (3 percent), as shown in Figure 7.

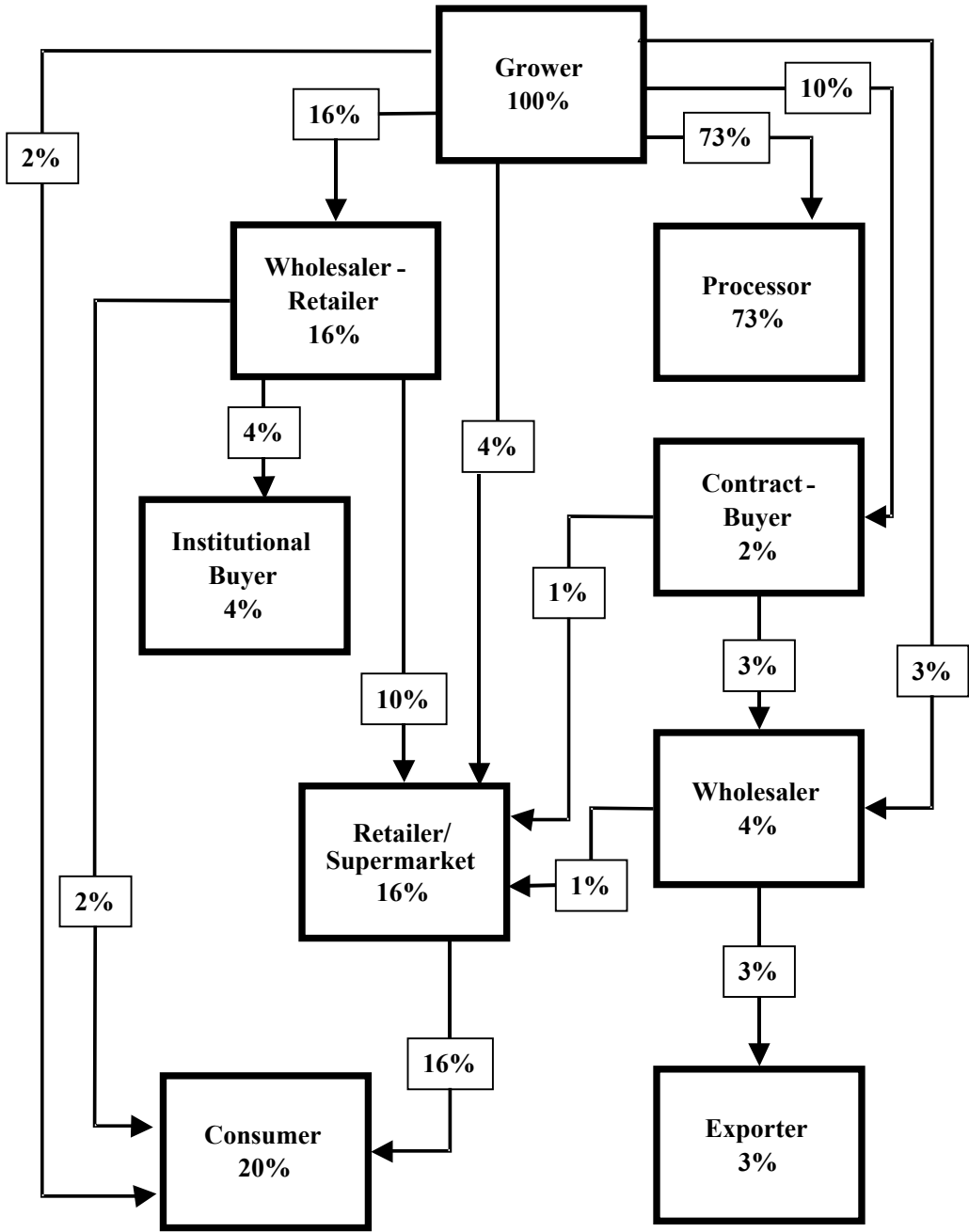
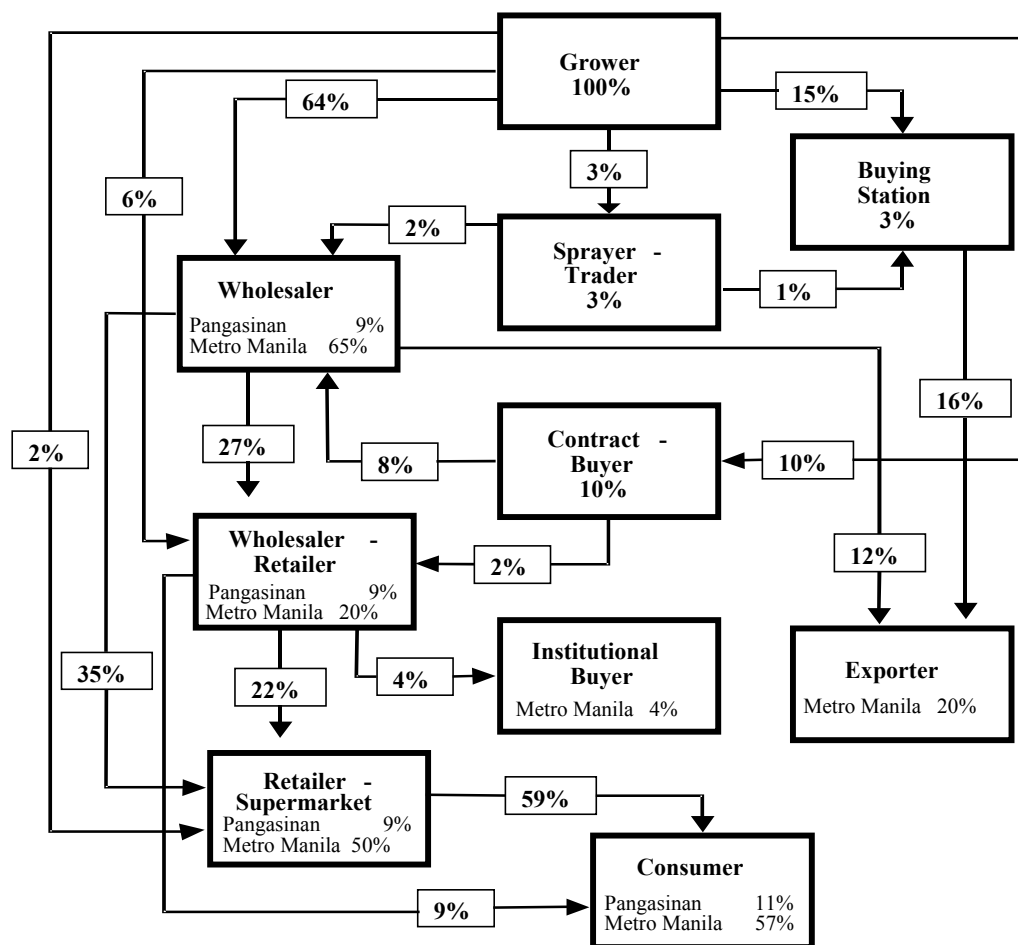


Figure 6: Marketing Channels of “Carabao” Mangoes in Pangasinan  
December 1992 – February 1993



**Figure 7: Marketing Channels of “Carabao” Mangoes in Cebu, March-May 1993**

## FINDINGS

### Competition

There is minimal competition among the island provinces as harvest periods are very distinct from each other. Year-round production in Mindanao is possible because of its favorable climate and the absence of typhoons. Competition for supplies occur during the lean months and high prices benefit a smaller number of growers who are able to induce flowering for harvest during the off-season period.

### Productivity Improvement

Improvement in productivity begins in the selection of land and location of mango farm, as well as the planting distance of the trees. Once the tree is established, the grower has to follow good agricultural practices especially in inducing flowering and protecting the fruits from insects. Availability, timeliness of supply and affordability of inputs particularly chemical inducers, are critical factors in mango production.

### **Management**

Small and medium size farms are more manageable especially in farm operations such as fruit wrapping and harvesting. Numerous problems have been observed in plantation scale mango operations in the Philippines. Examples are unproductive trees (trees do not flower or produce only few flowers), lack of labor (especially for harvesters), and difficulty in pest management.

### **Organizational Growth**

Individual growers are now more aware of the need to improve their cultural practices. Firms involved in marketing are into supply management by establishing their own buying stations and/or buying from other wholesalers. Lack of capital, poor and expensive transport system are constraints to improving the logistics in the assembly of the produce from numerous small growers across the archipelago, in turn slowing down the growth of marketers. Further, the size of the existing export markets are primarily influenced by the quarantine protocols and other regulations of the importing countries.

### **Customer Reaction**

Customers are affected by the high domestic mango prices especially in comparison with cheaper imported fruits. The short shelf life is also a problem; disease damage occurs as the fruit ripens. Thus, the improvement of the product quality starts in the production stage and monitored through the supply chain until it reaches the consumer.

### **Use of SCM Systems and Technology**

The application of the SCM systems and technology especially in the agribusiness is rather new and has to be further explored and adopted by more SMEs in the Philippines. Marketers, as those involved in the export business, have more established supply management systems than other players in the mango industry.

The application of SCM systems and technology is important especially for a country composed of numerous islands and transport takes different modes such as land, sea and air. The ability to transport the produce across the different parts of the country is already a challenge in itself.

### **Impact of SCM on SME Sector**

SCM is extremely important for SMEs especially considering the great number and variety of producers and quality of the product.

### **Current SCM Development Efforts**

The development of the SCM is very low particularly in agriculture and in the country. With the concerns in making the Philippines agribusiness globally competitive, the implementation and application of SCM can have great impact on the cost-efficiency of various agricultural commodity systems.

## **CONCLUSION**

SCM has good applications in the agribusiness sector. It deserves further exploration and direct adoption by SMEs. Both the government and private sectors must work together in promoting its implementation and application, and determining its impact on the SMEs.

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## **PHILIPPINES (2)**

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### **THE PHILIPPINES AT A GLANCE**

The Philippines lies off the South East Coast of the Asian mainland. It is an archipelago, which consists of approximately 7,107 islands and islets. Bordering the Philippine coastline is the South China Sea to the west and north, the Pacific Ocean to the east and the Celebes Sea and the waters of Borneo to the South. The Philippines has a total land area of approximately 300,000 square kilometers. It is about the same size as Italy or the state of Arizona in the United States. It is mountainous and dotted in places with volcanic peaks. Its coastline spreads to more than 14,400 miles.

The Philippines is divided into 3 major island groups: Luzon, Visayas and Mindanao. While Luzon and Visayas are the center of commerce, Mindanao on the one hand is the food basket of the Philippines having many of its fruits, vegetables and staple crops grown in its vast agricultural area.

The Philippines is predominantly a Christian country in Asia. About 93 percent of the population is Christian of which 83 percent belongs to the Roman Catholic Church. Islam is also adhered within the Mindanao area - the southern part of the country. There are about 87 local dialects spoken throughout the country with Filipino as the national language. English is the basic language in business, government and schools.

The Philippines is mainly agricultural with the furniture, gifts, toys and houseware, agri-based products, electronics, metal as its main industries.

### **INITIATIVES TOWARDS SUPPLY CHAIN MANAGEMENT FOR SMEs**

The Philippine Government has long since identified the small and medium enterprises (SMEs) as the engine of growth and development for the Philippine economy. It has since given high priority to this sector for their vital role in generating much needed employment opportunities especially in the countryside. The promotion of SMEs is also seen as a strategy for the dispersal of economic activities in the countryside thereby unclogging the already crowded main growth areas.

However, for many years the government and SMEs have concentrated a great deal in improving productivity and efficiency. Focus was continuously poured to these areas under the premise that this will help the SMEs become more competitive and profitable. Several programs were initiated and implemented towards achieving these objectives through productivity improvement. But as the performance of the Philippine economy remained lackluster and the competitiveness of the SMEs particularly at the global level decline, the private sector as well as the government realized that focusing on simple productivity approaches or strategies was good but not enough. It was observed that so many resources are still left wasted in manufacturing, agriculture, industry and services sectors. Hence an urgent need to refocus and redirect strategies were immediately tabled

on several discussions between the government and the private sector mostly composed of the SMEs and the academe.

The areas of focus identified were the adoption of industry clustering, development of the retailers sector through a Retailers Act, and the provision of an Information Technology (IT) environment through the passing of the first Philippine E-Commerce Act. Among these three strategies, the industry clustering approach has to date took its hold on a large portion of SMEs particularly in the furniture, gifts, toys and houseware and the food processing sectors.

## **INDUSTRY CLUSTERING**

Industry clustering is defined as the grouping of firms, allied businesses and buyers – all operating under an environment shaped by the government, the physical and cultural heritage and available infrastructure. It is also the grouping of interrelated or interlinked activities composed of industries, suppliers, required support services, infrastructure and institutions. Geographic focus can range from single city, region to a network of neighboring countries.

Industry clustering is expected to result in a single integrated plan for the organization such as, marketing, distribution, manufacturing and purchasing along the supply chain. Industry Clustering will serve as the overall mechanism through which these different functions can be integrated. Industry clustering is the closest concept to supply chain management (SCM). It can be perceived as a prelude to the application of a systematic and comprehensive supply chain. It is believed that once industry clustering is fully developed and made operational, SCM would follow easily as all other businesses come together in support of one other.

Industry clustering was introduced to SMEs in 1999 through the Philippine Export Development Plan which mandates clustering as the main strategy for SME development. Since then, it moved at a gradual pace and accelerated at a much faster rate now. It gets much support from the furniture sector and its sub-sectors and the food-processing sector. In the early part of 2000, the Department of Trade and Industry identified two industry sectors for industry clustering and development: the furniture and the food processing industries. Hence, this paper will focus on the supply chain in the food-processing sector.

## **FOOD PROCESSING SECTOR**

The Philippine food-processing sector is made up of three major sub-sectors:

- a) Processed marine products (i.e. chilled/frozen, preserved or prepared),
- b) Processed fruits and vegetables (i.e. jams, jellies, candies, marmalade, pastes) and
- c) Fruit-based beverages (i.e. fruit juice, soft drinks, bottled water).

In terms of growth, the country's value of processed fruits and vegetables export grew by just 0.66 percent in 1993 to 1997. Processed marine products performed better with a 2.9 percent increase, exceeding the national growth of total processed food exports of 2.43 percent. Marine products have been a consistent contributor of foreign exchange earnings. Exports of marine products reached US\$147.8 million in 1997 with 91 percent of export shares going to the USA, Germany, Japan, Canada, the UK, Africa, Singapore and the Netherlands. On the other hand, the country's export of processed fruits and vegetables



reached US\$359 million in 1997. Mindanao, also known as the food basket of the Philippines, leads the processed fruit export. Top export destinations of processed fruits and vegetables are the USA, Japan, Hong Kong and Canada.

**Table 1: Summary of Supply Chain for Processed Fruits**

	INPUTS	PROBLEMS
<b><i>Sourcing of Raw Materials</i></b> Foreign or local Wholesale or retail	Fresh fruits Sugar Chemicals (benzoate, citric acid, food coloring, etc.)	<u>Macro/micro levels</u> High sugar prices High price of R.M. Volatile forex Seasonal supply of R.M. Geographic distance of sources of R.M. High transport and communication costs Shortage of R.M. supply
<b><i>Processing</i></b>	Equipment (slicer, grinder, cooker, mixer, sterilizer, sorter) Transportation Communication Warehouse/storage	High cost of equipment and spare parts Lack of storage handling facility Poor production facilities and proximity of production factories
<b><i>Packaging</i></b> Bottled Canned Tetrapack Plastic	Tin cans Cartons Wrappers/plastic Glass ware	Poor product design High cost of packaging material
<b><i>Distribution</i></b> Foreign Local Wholesale/retailer Through contractors Through direct selling	Communication facilities Distribution centers Trade fair shows/exhibits Marketing HR	Short shelf life Forex changes Seasonal demand Changing customer preferences Availability of substitutes

Table 1 is a summary of a simple supply chain for the processed fruit sub-sector, along with the presentation of the various inputs within the supply chain and the problems/challenges facing this sub-sector. It should be noted that each of these three sub-sectors in the food processing industry in the Philippines has its own respective difficulties encountered along the supply chain. The example of the processed fruit sub-sector is used to show the same type of problems faced by the other two sub-sectors.

Table 1 shows that there are still many problems faced by SMEs that are hindering them from pursuing a smooth and quick path to an effective and efficient management of their supply chain. Some of these problems may be internal in the SMEs but many of these problems are also within the scope of the government which the SMEs will have small or no control at all.

Largely, there are two primary overarching problems the SMEs have to overcome on

top of all the problems listed in Table 1. One is the need to improve the status of the agriculture and aquamarine sectors as the bulk of the raw materials in food processing come from these two sectors. Agriculture at present is the lowest growing sector of the economy. Many of the old plantation crops are facing troubled prospects. For instance, the biggest buyers of fresh Philippine mangoes are Japan, Hong Kong and Singapore but unstable supplies have threatened the market niches created by Philippine mangoes in certain lucrative markets. The same is true with the aquamarine sector, which is facing stiff competition and unstable supplies. Major industry problems in the marine sector are:

- a) over fishing which rapidly affected the supply of marine products such tuna,
- b) potential disease outbreak in the shrimps and prawns industry;
- c) less than adequate transportation system to efficiently bring processed fish products to international and even local markets.

Another major and basic problem is the inability of SMEs to quickly move into the IT arena. The mindset or attitude to go towards IT application in all areas of business functions is already set in the minds of the SMEs but financial constraints and the uncertainty of the local and global economy and markets are disabling them to make a bolder move. To support the SMEs, the government made a decisive and well-planned step by passing its first E-commerce Act.

## **CONCLUSION**

As mentioned earlier, there are already preliminary initiatives that the Philippine Government and the SMEs are undertaking along the line of SCM. The problems are serious enough for the government, the business sector and the academe to work together to form a consortium to support the SMEs. The solutions rest not only with the SMEs but also with effective collaboration among the government, academe and business community. With initial efforts being spearheaded, real commitment towards effective SCM is not very far.

## INTRODUCTION

The important aspect of running a SME efficiently is the effective management of all aspects of its operations. The efficient management of operations includes the fine performance of its supply, administrative and marketing systems. In an era of globalization and with many existing trade businesses, if an SME has not fine-tuned its operational systems, it would result in the organization's failure in the market and a breakdown of its structure. This finally will result in the closure of the organization. Where large organizations are involved, SMEs find it quite difficult to manage their supply systems if they are operating in the same field.

In terms of buying power of raw materials, the larger organizations always have the advantage. The large organization could always influence the supply system using their greater bargaining power. Since large organizations have the financial muscles and influence over the financial institutions, they could exert more control over many areas of financial matters compared to the SMEs. Even in areas such as production, purchasing power, marketing, shipping, E-commerce, just to name a few, large organizations have a distinct edge over the SMEs.

However, in production, the SMEs may not need larger supply positions or stockholding to be as successful as their larger counterparts. Similarly, SMEs need not necessarily require high capital investment on the stock holding as high capital investment in the long term may not yield good profitability for SMEs as the interest components that build up on a long term will erode their profitability and affect their sustenance. However, investment in sophisticated machinery, which is usually expensive, will have an effect on the SMEs unless otherwise dealt with. In some instances, government institutions have subsidized them.

We will consider factors such as production, incentives and finances, packaging and storage, labor issues such as welfare and education, government regulations, currency exposure, and other issues as general factors affecting a supply chain.

### **Production**

Small growers are often at a disadvantage compared to the larger growers, especially in terms of the quality of their produce. Their methods of planting, manuring, harvesting may have an effect on the final product. For larger producers, the systematic method of planting, manuring, and harvesting have a positive effect on the quality of the final product.

Due to the inappropriate methods used by the small growers, their products inferior in quality. Poor quality often result in rejection in their produce, and rejection will result in a breakdown in the supply chain, since their produce do not reach the end users. On the other hand, larger growers may not face such a problem. Their products, which are manufactured according to a planned or programmed set up, will most definitely reach the end users. Therefore, they can always enjoy a complete supply chain. However, SMEs require knowledge, training, and infrastructure in order to compete with the large growers who are more advanced.

SMEs who are involved in growing produce must be nursed well when entering the supply system. If their supply of produce fail initially due to lack of proper guidance, the chances are that they will be discouraged to go further since finances play a big role for them. They exist on borrowed capital with interest to be paid back. Therefore, there is a need for the responsible authorities to take the initial steps to educate the SMEs entering the supply chain by providing appropriate educational programs, training, technology transfer etc. In addition to targeting management, some of this training needs to be focused on the workers themselves.

The larger growers have already acquired the necessary experience and therefore, they are in a stronger position to dominate or control or take over the smaller growers for their benefit. At the same time, there are many SME growers who successfully manage their supply system as they follow the rules and regulations of tea planting and have obtained advanced skills on the management of their commodities.

### **Incentives and Finance**

The incentives that are relevant to SMEs, relate to concession on the inputs used in the growing of their produce. The concessions could be in the form of discounted fertilizer, seeds or plants at nominal fees for re-planting purposes, availability of land at reasonable prices, low interest rates for the purchase of land and machinery, etc. These incentives may be removed in the long term but essentially in the initial stages of entering a competitive environment, it has to be in place to stabilize the industry. The need to have collaterals for bank loans has discouraged many SMEs from moving forward. The larger enterprises have a distinct advantage over the SMEs in terms of offering collaterals to banks due to their size and capacity. A more relaxed financing environment would encourage SMEs to plod on. Without adequate incentives and finance for the SMEs, their supply of produce will be adversely affected, causing a breakdown in the supply chain.

### **Packaging and Storage**

Packaging too plays a vital role in the supply chain. There are many methods of packaging used by the SME growers following the harvesting of their commodity. However, in Sri Lanka, research has established that around 40 percent of the produce harvested is wasted due to improper packing and handling. The packaging for post harvest of perishable products has not been developed much. There are many reasons for the poor use of post harvest technology among the small and medium producers. The non-availability of cold storage facilities for proper storing is the main reason for post harvest loss. Due to the lack of proper facilities, these small and medium growers store their produce after harvesting in cheap, affordable packaging. This results in a fair percentage of their produce being spoilt on arrival at the markets and sometimes even before, they are loaded on to the transport vehicles. This is one of the factors causing a serious breakdown in their supply chain. On the other hand, large producers have developed their own methods over the years and used these to their advantage and benefit. Large producers have developed their own methods over the years and use these to their advantage and benefit. Hence, relevant government authorities and research bodies should seriously look into and address this post harvest problem faced by the small and medium sized growers since proper recovery of the produce will not only maintain the supply chain but will also help to reduce the market price of tea to a level affordable to many consumers.

It is also possible to increase the quality of the supply chain by merely improving the packaging system and storage facilities. The result will be a benefit to the local consumers and the overseas buyers – thus contributing to the better performance of the product in the

competitive international market. Unlike the market-oriented large enterprises, most SMEs never pay adequate attention to understand consumer reaction to their products, their packaging and the underlying factor of consumer behavior in their target markets. This is a key area missing in production oriented traditional planning system.

### **Labor Issues**

In Sri Lanka, labor issues such as trade unions, play a deciding role in the nature and continuation of the supply chain. Its kings ruled Sri Lanka for two thousand years but following foreign invasions and occupation of its harbors by a succession of European countries such as Portugal, Holland and England, from 15<sup>th</sup> to the 20<sup>th</sup> century and complete domination by England since 1815, many changes occurred in its socio-economic fabric. One key development in the 20<sup>th</sup> century was the establishment of trade unions under leftist leadership. Labor issues have been an important issue in the political environment since then. The emphasis on worker rights in their working places and outside is very important. This has created many issues where labor is concerned.

Trade unions were formed to protect and advance the rights of workers. The growth of trade unions was mainly a result of labor handling difficulties by large industrial organizations. After years of concentrating on large organizations, lately the trade union movement has spread to the SMEs as well. Because of labor disputes, work stoppages have occurred in SMEs affecting productivity and the supply chain. To prevent such breakdowns in the supply chain, many incentives introduced by the larger enterprises in Sri Lanka were adopted by the SMEs, such as those of labor welfare and education.

### **Labor Welfare**

Many SMEs have now introduced welfare facilities to the workers to prevent disruption of work. Some of the welfare facilities provided by SMEs in the industry are:

- Proper housing
- Medical assistance and sick leave
- Maternity facilities
- Education facilities for children
- Annual holidays as per regulations including religious purposes
- Minimum wages which compare well with other sectors

### **Education**

The level of education of employees can affect SCM implementation and operation. Low literacy rate can result in poor productivity and difficulties in training. However, in Sri Lanka the literacy rate is around 86 percent, which is very high compared to countries in South and South East Asia. As such, where education level is concerned, it is not a major factor that affects SCM or the SMEs in a substantial manner.

### **Government Regulations**

Government regulations that hinder the free operation of SMEs in the areas of exports and imports must be re-examined. Certain laws and regulations introduced by government such as rules relating to taxes, duties, etc. affects the SMEs' effectiveness in managing their supply chain. Restriction of imports and exports by many countries also affects the SMEs' SCM. Doing business overseas requires careful examination of a host of regulations, requirements, and obstacles posed by the importing nation.

Putting up a Web site offers its own challenges, including translation of text and adaptation to the importing country's culture, use of graphics and manipulation of

technology. However, that is only the tip of the iceberg for companies hoping to communicate and sell their products to these overseas customers. SCM and order fulfillment take on a new meaning when applied to overseas markets. Companies must be aware of a labyrinth of government import and export regulations, imposed both by their own countries and the countries to which they are shipping. Some of these regulations are the result of multilateral accords such as the World Trade Organization (WTO). Other rules cross the borders of multilateral accords and national laws, such as health regulations and intellectual protection rules. Politics and laws as well as the logistics and costs of shipping surround the core of international business transactions like the layers of an onion. Moreover, like an onion, they can make you cry as each layer is peeled.

### **Currency Fluctuations**

Another issue to consider is that of currency fluctuation, especially when currencies lose relative strength. Recently, currencies like the Japanese yen, Russian ruble, Indonesian rupiah, Australian dollar and a host of other Asian currencies have depreciated due to the Asian economic crisis. Even the Canadian dollar has not escaped the downward drift. Goods purchased online from countries with stronger currencies become more expensive.

### **Other Factors**

The following issues too play a vital role in the SCM of the tea industry in Sri Lanka either directly or indirectly. They are:

- a) Current security situation in Sri Lanka
- b) Political stability
- c) Finding right partners for joint ventures
- d) Bureaucratic problems in the government sector.

Sri Lanka is blessed with a versatile bureaucracy compared to most developing countries. Lending agencies prefer to lend to Sri Lanka because of the relative ease of completing projects in Sri Lanka when dealing with local partners.

Sri Lanka has a relatively well-developed transportation network too. There are opportunities for further development but this is not an aspect that hinders the SCM of the growers to any considerable extent. However, having adequate transportation links, such as regular surface and air connections, are essential for an import or export industry as a whole to be successful. It enables their commodities to reach the correct place at the correct time.

## **THE WTO**

The WTO conducted its Ministerial Sessions from November 9<sup>th</sup> – 13<sup>th</sup> in Doha, Qatar. Primarily, an agreement was reached on launching a new round of trade negotiations with a view to liberalizing international trade. China and Taiwan received full membership to the WTO. Russia is still negotiating the terms of its admission. Many issues were discussed such as reducing existing barriers to accessing the developed world markets. Concerns for developing countries were also discussed. All countries, be they developed or developing, must be treated at the negotiations as equal partners. Concerns continue on the reasons that benefits of the existing multinational trading system still largely elude the developing countries.

Protectionism mainly by developed countries relating to the vast agricultural sector currently estimated to exceed billions of dollars, and subtle forms of protectionism, including anti-dumping measures, were discussed. These will be opened for negotiation in the new round of talks. There were also opposition to some Asian countries who imposed tariffs on sensitive items and to link trade and labor standards and the environment.

Some Asian countries expressed satisfaction that they had been able to secure a commitment from developed nations on the reduction of export subsidies, which would help their domestic agricultural sector. Most of the issues raised at the WTO conference relate to the completion or breakdown of SCM of enterprises. For the exporters or importers, the outcome of the WTO talks is very important for their survival.

## **CASE STUDY – TEA INDUSTRY IN SRI LANKA**

### **Overview**

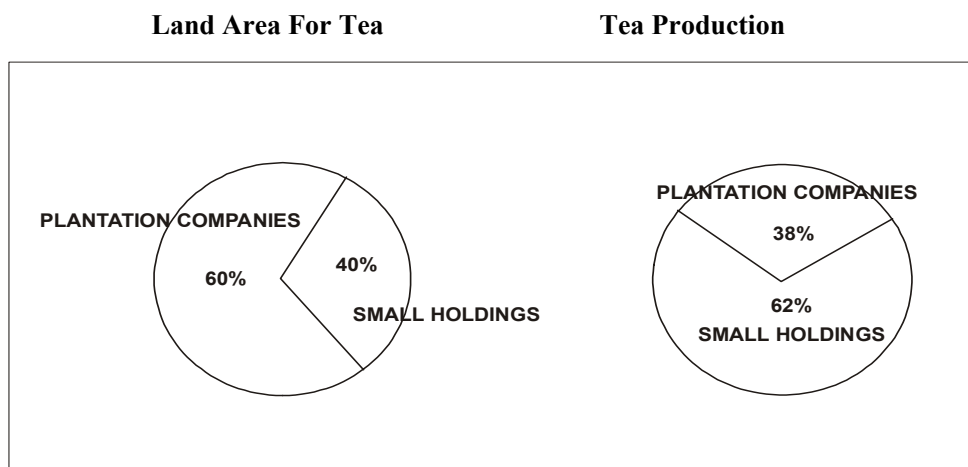
Sri Lanka, the pearl of the Indian Ocean is known for its diverse culture and scenic beauty, while blessed with fortunes of nature to give a different array of climates. British planters first introduced tea to Sri Lanka, famous in ancient times as “Serendib”, in the second half of the 19th century as a replacement crop for coffee which was destroyed by a leaf disease. A Scottish planter by the name of James Taylor introduced commercial planting of tea in Sri Lanka in 1867 on 19 acres of land at Loolecandera Estate in Deltota, which has developed, into a major agricultural industry today.

In the days gone by, tea was deemed a perennial plantation crop. Production on smallholdings was considered uneconomical. It was then argued that small holders could not practice the needed cultural and economic procedures, mainly due to the fact that small extents of land did not lend themselves to the required economies of scale. Moreover, the 19<sup>th</sup> century thinking was based on the fact that smallholder cultivation was not feasible due to the necessity of industrial scale factory processing and manufacturing. Ironically, quality tea production was also considered beyond the capacity of small holders. Hence, smallholder cultivation of tea up to the first half of the 20<sup>th</sup> century was believed to be a marginal phenomenon.

This was a paradigm, which dominated thinking during most of the last century. However, tea production in Sri Lanka has seen a transformation during the past 30 years, which neither the early British plantation pioneers nor the veteran Sri Lanka planters could have ever envisioned. Today, tea is more of a smallholder crop than a plantation crop. Most of the tea output is produced by small farmers (see Figure 1). Tea productivity on smallholdings is close to double that of Regional Plantation Companies. Figure 2 shows the contribution of tea to the various enterprises by yield per hectare and income.

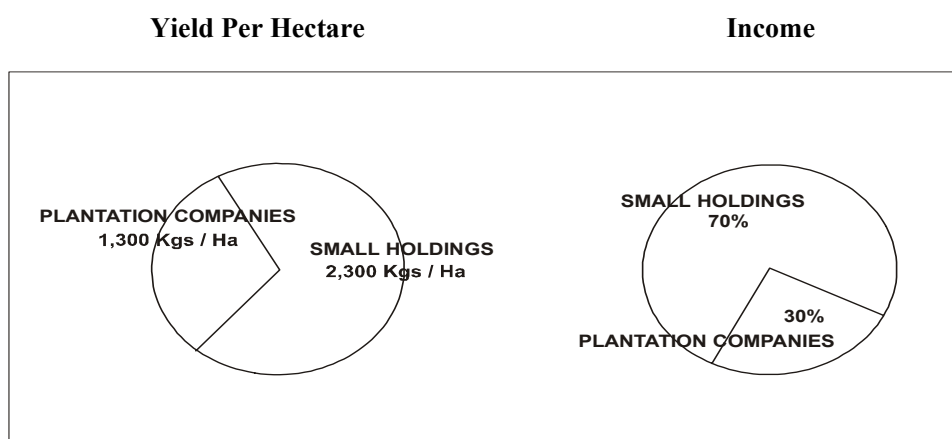
### **Developments in Sri Lankan Tea Industry**

After developing as a private sector industry, large tea holdings were nationalized in 1972 as a response to the nationalistic feelings and prevailing political thinking. Subsequently, many of these holdings were privatized. The initial development works undertaken after privatization by the new management was focused in two directions: increasing production to reduce unit costs and improving the quality of the output to obtain better prices. These objectives were to be achieved without any increase in area used for growing tea. The two areas that have seen much development and improvement are the fields and factories.



**Figure 1: Distribution of Tea Growing by Land Area and Production**

Note: Smallholdings represent mainly SMEs. But some plantation companies too fall into the SME category.



**Figure 2: Contribution of Tea by Yield and Income**

A package of updated agricultural practices and new technologies has been implemented to make the industry globally competitive. Soil conservation measures, increased fertilizer application after field-wise soil testing, new harvesting techniques such as sheer plucking, replanting and infilling with higher-yielding clones, integrated pest management, and the introduction of sprinkler and drip irrigation systems are some of the field practices and development implemented to bring the yields up to their full potential.

In the area of factory development, the introduction of modern technology, such as the installation of fluid bed driers, dust extractors, color sorters, stand-by generators, electronic process control equipment, and other new types of machineries were used for improving the overall process. Extending factory capacity to meet increased crop harvest



with improved hygienic standards in manufacturing have also been undertaken to improve the quality standards of the consumer product. These development programs have yielded demonstrable results. The impact is shown in Sri Lanka's overall increase in tea production, yield per hectare and price.

### **Marketing Development**

Marketing support is critical for sustaining growth in production. For Sri Lanka, the market for tea is almost entirely overseas. Enhanced earnings to the country from tea exports flow fundamentally through domestic blending, packing, labeling, and branding. The pace of development in these downstream operations has been accelerated by closer collaboration between producers and exporters as well as through strengthening backward linkages between some of the producers and exporters.

For a long time, Sri Lanka has the advantage of possessing highly experienced and skilled blenders who can blend teas to match any international consumer standard. In 2000, 40 percent of Sri Lanka's tea output was channeled to the international market in consumer packs and bags weighing less than 3 kg. A further 40 percent was exported in packs over 3 kg. as blended, labeled and sometimes, branded products. These value-added operations have resulted in Sri Lanka marketing 80 percent of its total tea exports in value-added forms. Only 20 percent of Sri Lanka's output is now exported in primary commodity form.

In a globalized free market environment, the government does not determine competitive advantage. However, the fiscal and taxation policies can have a positive effect in creating competitive advantage for the country. In recent times, the government has provided several incentives to promote domestic value-adding, such as:

- a) Duty-free importation of packing materials required for exporting
- b) Lower rate of taxation on income derived from exports of value-added tea products
- c) Duty-free importation of capital and intermediate goods required for processing tea exports
- d) Zero rating for Goods Services Tax (GST) on procurement for exports
- e) Exemption from the National Security Levy for purchases for export processing
- f) Uni-national and brand promotion funding
- g) Deregulation of unnecessary controls and simplification of export procedures and documentation

The initiatives of the private sector, supplemented by the fiscal and taxation support provided by the government, has enabled Sri Lanka to increase her earnings from tea exports from Rs.43 billion in 1999, to Rs. 53 billion in 2000, and tea production has also been growing speedily since 1995 (see Table 1). There are over 200 licensed tea exporters in Sri Lanka catering to international clientele in more than 60 countries.

### ***Study on Strategic Marketing Options***

To accelerate domestic value-added operations and enhance the competitiveness of the tea industry, the Sri Lanka Government commissioned a study to evaluate the strategic long-term outlook for tea in terms of future patterns of consumption and import demands. The goal of the study is to recommend options for Sri Lanka to maximize her export earnings from tea by capitalizing on the opportunities available in the global market. The Asian Development Bank funds this study.

**Table 1: Tea Production and Yield**

YEAR	TEA PRODUCTION	YIELD	Producer (Auction) Prices
	Million kg	Kg per hectare	SL.Rs/ Kg
1995	246	1,313	77-21
1996	258	1,368	103-88
1997	277	1,465	119-40
1998	280	1,495	134-35
1999	283	1,515	115-31
2000	306	1,618	135-53

### **New Direction of Tea Research**

The Tea Research Institute (TRI) of Sri Lanka has contributed positively towards improving productivity. Research in process technology is aimed at introducing electronic temperature, humidity, and pressure sensors into the manufacturing sequence using an automated PC-based monitoring, command, and control system. Computerization and automation will improve worker productivity. Preliminary use of a solar field, developed by the TRI for pre-heating the air used in tea drying, indicates a fuel saving of 25-34 percent. A computer-based rolling program has also been developed at the TRI to ensure the quality of tea produced efficient use of machinery and improved worker productivity. A patent is pending. The TRI Selective Tea Harvester (TSTH) won the Gold Medal at the 28<sup>th</sup> International Exhibition of Inventions in Geneva. A worker trained in its use earns considerably more than a manual plucker. At the same time, growers have recorded savings in plucking costs of more than Rs.2 per kg. of made tea. A Sri Lankan company is now mass-producing the invention and growers are using the TSTH with excellent results. Due to the efforts of the TRI and Sri Lankan tea growers, the country's tea has been rated as the cleanest in the world as far as pesticide and residues are concerned. This rating was confirmed at the 17<sup>th</sup> Technical Committee Meeting on Tea of the International Standards Organization in February 1997 after the I.S.O. had carried out analyses of made tea samples from all major tea producing countries in the world.

### **Socio-Economic Development of Estate Workforce**

The 270,000 tea estate workers form the backbone of the tea economy. Most are descendants from migrant workers brought into Sri Lanka from India as indentured labor when the British opened up the tea plantations during the colonial era. In the past, the estate workers lived a secluded life, cut off from the rest of the urban and rural community. With education, the advent of mass media, and increased urbanization, there is now an increasing tendency by them to migrate in search of non-estate jobs, such as in garment factories, the mercantile sector, and the service industries in the Middle East. Some of the tea plantations are already facing labor shortages, particularly during the cropping months.

The harvesting of green leaves for the manufacture of tea is done manually by women. The work is monotonous and repetitive. It has been computed that about 1,200 hand movements are required to harvest one kilogram of green leaves. Given the usual target of 18 kilograms of green leaves to be plucked a day, it means that 21,600 movements by hand are required to earn a days' wage.

Several initiatives have been taken by private sector management to promote labor retention on estates. The new management's approach is to work towards a contented and

motivated workforce to achieve improved productivity. Several social development schemes are now being implemented to improve the living standards of the work force. Funding from donor agencies from the Netherlands, Norway and Japan also supports these schemes. Some of the social development programs now under implementation are:

- a) Construction of new worker cottages;
- b) Renovation of existing residential line rooms;
- c) Construction of childcare facilities;
- d) Construction and upgrading of dispensaries, maternity wards, and community centers;
- e) Supply of safe drinking water; and
- f) Improvement in sanitation and health services.

The programs are designed not merely from a social perspective, but more importantly, from a commercial standpoint in order to achieve higher productivity. Labor costs have increased significantly and will continue to do so. If wage costs are to be accommodated without undermining the competitiveness of the tea sector, labor productivity will need to be increased. Herein lies the rationale for the business decision by the privatized tea estates to invest in social infrastructure.

### **Global Demand for Tea**

World tea production (taking both black tea and green tea into account), is currently estimated around 3 billion kg (3 million tons) per annum. The four major players in the tea growing world are India with estimated production of approx. 850 million kg, followed by China with a projected crop figure of around 685 million kg, Sri Lanka with another record output of about 310 million kg, and Kenya a forecasted production of 280 million kg during the year 2001. The global tea crop as well as the world demand for tea is expected to grow at a rate of about 1 percent during the current year, although strong regional variations exist. Tables 2 and 3 show the tea contribution to world tea export by Sri Lanka and the major importers of tea.

**Table 2: World Production/Exports against Sri Lanka's Share (1996-2000)**

<b>Year</b>	<b>World production (million kg)</b>	<b>Sri Lanka's production (million kg)</b>	<b>World exports (million kg)</b>	<b>Sri Lanka's export (million kg)</b>	<b>% share of Sri Lanka's export</b>
2000	2,903 (est.)	306	1,305 (est.)	281	22
1999	2,928	284	1,341	264	20
1998	3,045	280	1,306	265	20
1997	2,787	277	1,201	258	21
1996	2,708	258	1,128	234	21

**Table 3: Tea Imports by Major Importing Countries (1996-2000)**

Country	2000 (million kg)	1999 (million kg)	1998 (million kg)	1997 (million kg)	1996 (million kg)
C.I.S.	188	190	180	200	160
U.K.	134	137	146	150	148
Pakistan	112	108	112	87	111
U.S.A.	88	93	96	81	89
Egypt	63	73	65	78	6

A brief look at the actual performance in the recent past as shown in Table 4 gives a glimpse of the situation of tea exports in different segmentations.

**Table 4: Different Tea Export Segments (metric tons)**

Year	Bulk Tea	%	Packet Tea	%	Tea Bags	%	Others	%	Total
2000	182,773	65	74,922	27	12,129	4	11,669	4	281,493
1999	171,638	65	73,216	28	11,250	4	7,838	3	263,942
1998	160,116	60	86,746	33	11,946	5	6,497	2	265,305
1997	148,274	57	94,825	37	10,781	4	3,784	2	257,664
1996	129,727	55	93,715	40	9,246	4	1,619	1	234,307
1995	132,145	56	93,877	40	7,541	3	2,187	1	235,750
1994	152,175	67	64,386	29	6,819	3	1,707	1	225,087
1993	129,003	61	74,857	36	5,138	2	1,675	1	210,673
1992	117,699	66	55,033	31	4,541	2	942	1	178,215
1991	136,306	65	69,783	33	4,318	2	799	-	211,206
1990	133,435	62	76,327	35	4,781	2	1,071	1	215,615

With respect to income generated on tea exports, the following pattern is found in Table 5.

**Table 5: Quantity and Value of Tea Exports**

Year	Quantity (kg)	Value	Value (US\$/kg)	FOB Price	US\$/kg
2000	281,492,596	51,048,406,434	672,767,304	184.17	2.39
1999	263,943,377	42,072,795,478	597,709,838	159.40	2.26
1998	265,304,748	48,204,106,811	746,309,132	181.69	2.81
1997	257,664,180	40,424,530,264	685,277,679	156.89	2.66
1996	234,307,587	32,536,487,964	588,662,376	138.86	2.51
1995	235,750,064	23,991,187,106	468,120,724	101.77	1.99

### **Sri Lanka's Contribution to Global Tea Market**

It has been accepted by all segments of the tea industry in Sri Lanka that a major drive towards a greater value added ness is essential to sustain the viability of all players. The identification of market needs, diversification of the available product range, greater development of brands, further improvement of quality, better productivity and cost effectiveness as well as strategic promotional outlays is some of the important components for gaining market access.

While Sri Lanka has broken its all time tea production record year on year since 1996, the country could also boast an unblemished record for the past 8 years of continuously being the largest tea exporter to the world. More importantly, Sri Lanka represents almost one third of the total value involved in global tea exports out of the entire producer member states. The superior packaging, well planned infrastructure,

central geographical location especially on the international sea routes, a very disciplined workforce, availability of an abundance of professionally qualified and experienced tea veterans, etc. has attributed to this strength. As the predominant supplier of tea to the world, Sri Lanka has a well-diversified range of import destinations. Thus, its dependence on any single buyer is diluted to a great extent, giving an extremely strong marketing position. Since the domestic demand is around 25 million kg of tea per annum, the export availability is close to 95 percent of its production. A traditionally export-oriented agricultural based economy, coupled with a highly developed packaging capability and a disciplined as well as a professional workforce will keep on supporting the tea industry in Sri Lanka to reach greater heights in future.

## **CONCLUSION**

The rapid globalization process, among other factors, has had a major impact on the supply chain management of many SMEs. The extent of the effect generally depends on the type of commodity and the prevailing circumstances. Some have dealt with the changes better than others. In particular, increased competition among products or commodities is a major factor in the market environment and has tended to create a struggle between the SMEs and larger organizations for market share and survival.

In Sri Lanka, SMEs in addition to the factors common to all SMEs, are confronted by elements such as international currency fluctuations against a relatively weak local currency, problems caused by an adverse trade balance, inflation in the domestic environment, etc. These elements tend to cause high variances in the supply chain of commodities such as tea. The industry, which has a 150-year history has adapted reasonably well to these challenges and constraints and continues to forge ahead. Helpful governmental policies and managerial innovations have assisted it to prosper despite the varied challenges. Effective, aggressive and calculated management systems such as SCM have been introduced. The areas of possible breakdown in supply chain are well monitored and controlled. Hence, the ability of Sri Lankan tea to maintain its pre-eminent position as the best tea in the world. The future prospects and the continuity of SCM in the tea industry in Sri Lanka will be affected by the following:

- a) The production and processing of tea need to be well maintained by the continued introduction of new machinery, use of skilled labor, motivation of labor through provision of improved welfare etc.
- b) Maintaining existing market share as well as penetrating new grounds. The Russian Federation, other CIS countries, Pakistan, UK, Egypt, and the USA continue to account for over 50 percent of the total tea import volume of the world. Their continued presence in the market will benefit Sri Lankan tea producers. As the disposable income levels in many Asian countries rise, tea consumption in these countries is also projected to increase. With increasingly recognized health benefits of tea, further propelled by product diversification such as organic tea, ready to drink tea, etc. the sophisticated consumer is likely to shift to tea drinking for its health benefits.
- c) The FAO also estimates a relatively small tea price increase in the world market during the next five years. As a result, limited additional growth of import demand is projected, offering a marginal incentive for expansion.
- d) High import tariffs on tea by some heavy tea consuming countries such as Turkey, Pakistan, Egypt, and Iran. The globalization process is anticipated to contribute to

lowering these duties rather significantly in the future, making it more economical to consume tea. Hence, the consumption in such developing countries with a significant population growth rate is estimated to expand between 2-3 percent annually.

Of the four major tea-exporting countries in the world, Sri Lanka is one of them and will continue to be so during the next five years. This is mainly due to the effective management of supply chain in the Sri Lankan tea industry.

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Symposium on Supply Chain Management for SMEs  
[11-14 December 2001, Republic of China]

**Program and Schedule**

Day 1 – Tuesday, 11 December

Forenoon            Opening Ceremony

Presentation by Dr. Huan-Tsae Huang *“How to Build the SCM System”*

Afternoon            Presentation by Prof. Mark Goh *“Overview of Development of SCM for SMEs and the Singapore Experience”*

Presentation by Prof. Jong-Dae Kim *“Value Proposition through Cross Company Process Innovation”*

Day 2 – Wednesday, 12 December

Forenoon            Presentation by Mr. Ryoichi Watanabe *“Emerging Technologies to Support e-Business”*

Country Papers Presentation (I)

Afternoon            Country Papers Presentation (II)

Day 3 – Thursday, 13 December

Forenoon            Presentation by Dr. Li-Chih Wang *“Implementation of SCM System for SMEs in Taiwan”*

Presentation by Dr. Chin-Wen Lin *“Application of SCM to PC Industry – the ROC Experience”*

Afternoon            Field visit (INVENTEC)

Syndicate Discussion

Day 4 – Friday, 14 December

Forenoon            Syndicate Discussion/Outcome Presentation

Summing-up Session and Closing

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