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Implementing Supply Chain Management in Thailand Textile Industry

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ABSTRACT

The pressures from free trade in year 2005 has urged all Thailand's textile manufacturers to improve their competitiveness. The benchmarking survey depicts Thailand's On Time Performance index (OTP) as a problem and that it lags behind Asian leaders such as Singapore and Indonesia. Supply Chain Management, as a new industrial-wide management strategy, has become a solution to improve competitiveness as well as reduce lead time. From our pilot study in supply chain implementation project under the Thailand Textile Institute, it has shown that there are three major uncertainties- demand, supplier, process and control uncertainties- affecting customer lead time. Apart from that, information sharing within an organization and between supply chain echelons, particularly in order processing, raw material sourcing and production planning process are significant in managing efficient supply chain.

In this paper, we show how to apply the supply chain management concept in four textile case studies. The research shows how to map its business process, identify areas of improvement, and draw possible solutions by using industrial engineering tools. Outcomes of our study suggest that Thai Original Equipment Manufacturer (OEM) shall improve its information and material flows throughout its supply chain network by essentially adapting supplier relationship management (SRM) and customer relationship management (CRM) concept. The fours problem areas namely sales and marketing, production planning and control, shop floor production and information management are commonly found in this industry.

Keywords: supply chain management, textile industry, production planning and control.

1. INTRODUCTION

In a highly competitive market, all manufacturers strive to improve their product quality, to reduce their product and service cost, and to shorten their product delivery and response time to the market. With the emergence of a new business partnership and the information revolution, "Supply Chain Management" concept is made possible as a conventional management tool. This concept views the production management as a single enterprise that focuses on the importance of material and information flow from raw material to customer product delivery.

The Supply Chain Management concept starts to be widely introduced and promoted in many educational journals, conferences, and workshops in order to set common standard and best practices. The Thai government also realizes the importance of Supply Chain Management concept, which is evidenced in the Information and Communication Technology (ICT) Policy of Thailand 2002-2007 under the 6th national strategic plan. It is also indicated that textile and clothing business is

one of the industrial target we need to emphasise.

As a result, this pilot project was initiated, supported by the Thailand Textile Institute, Ministry of Industry. The research case studies come from four groups of textile industry in Thailand which are an OEM and mainly produce made-to-order products. Those textile groups can be divided into 2 categories. Firstly, large and medium size textile groups consist of four business units in the chain: yarning, fabrication, dyeing and garment. Finished goods from each unit are supplied to both within group and external customers. This business unit's model can be shown in Fig. 1 below. Lastly, a small garment industry is our last case study and it is supplied by external suppliers.

The aim of this research project is to apply supply chain management concept in a pilot case study in order to identify and propose areas of improvement for textile industry. Firstly, to clearly understand the enterprise's supply chain, primary interview was conducted. At this stage, it is found that the supply chain operating reference (SCOR) model is very useful for setting and structuring the interview questions. Then business processes need to be mapped. A tremendous amount of learning and improvement can result from the documentation and examination of the input-output (customer-supplier) linkages depicted in a process map. Hence, after gathering data from the case study interview, the Integration Definition (IDEF), easy-to-use techniques and standard languages of communication, was used to analyze the purpose that processes serve and the functions performed. Then analysis of IDEF0 processes led to the identification of the problematic areas and the opportunities for improvement. This allows us to propose an action plan for further implementing the supply chain concept. This plan focuses on restructuring the business processes, organisation and information flow in the entire supply chain.

2. REVIEW ON BUSINESS PROCESS AND SUPPLY CHAIN MODELLING

The part is to review on literatures that are relevant to model business processes in supply chains. To integrate business processes along the supply chain has been found to be a conventional paradigm of supply chain management. However, each industry sector would have its own requirements. The textile supply chain would then be provided to identify the specific requirements of the supply chain. The tools that can be used to model supply chains were next to describe.

2.1 Integrated Supply Chain Model

Handfield and Nichols (1999) stated that all organizations are part of one or more supply chains. Whether a company sells directly to the end customer, provide a service, manufactures a product, or extracts material from the earth, it can be characterized within the context of its supply chain. After the concept of supply chain has been appreciated in many industries, SCOR was developed and endorsed by the supply-Chain Council (SCC). This SCOR model aims to be a process reference model for a cross-industry standard for supply-chain management. The integrated processes of plan, source, make, deliver and return, spanning suppliers' supplier to customers' customer, aligned with operational strategy, material, work and information flows (Supply-Chain Council, Inc., 2003).

2.2 Textile Supply Chain

Ko *et al*. (2000) explored the importance of business type upon the adoption process for quick response (QR) technology in the apparel industry. They defined QR as the new establishment of new business strategies, new relationship, as new procedures to speed the flow of information and merchandise between retailers and manufacturers of apparel and textiles. With their survey results from men's wear, women's wear and children's wear, they concluded that business type was significantly related to perception of QR benefits. The use of QR techniques varied by apparel manufacturers. The most frequently used technology were small lot orders, reduced inventory sizes, computerized inventory system, production planning with customers, short cycle sewing, and short cycle cut planning. Forza and Vinelli (1996) presented an analytical scheme for the apparel design process toward QR. They proposed models of a descriptive and interpretative type which examine the temporal sequences of the activities and decisions taken in the textile apparel chain with reference to design. They summarized that areas of improvement in apparel design chain are the reduction of design lead time, the reduction of the variety of production input and the acquisition, during design, of preliminary information on future sales.

Perry and Sohal (2001) studied QR practices in supply chain within the Australian textiles, clothing and footwear industry. The study focuses on two key ob-

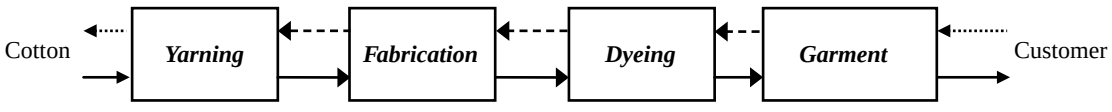

Fig. 1. Textile supply chain

jectives: to develop tight partnerships between clusters for retailer, manufacture and suppliers, to assist supply chain companies to implement electronic data interchange (EDI) technology for improved sales information flow. The results presented the importance of frequent supply chain meetings coupled with group planning, joint product development and frequently related and timely sales/forecast information. They also highlighted the need for open communication channel across supply chain.

Lin *et al*. (2001) presented best practices in Hong Kong textile and garment industry. They stated that apparel supply chain challenges are primarily from supplier and customer. While raw material costs are rising, consumers want higher quality with low process. They recommended that effective supply chain management requires integration of business processes and efficient information exchange between trading partners. To achieve this, they believed electronic communication can be the solution. However they suggested compatible global standard is needed as the backbone of E-commerce in the worldwide business community.

2.3 Supply Chain Business Process Modelling Tools

To understand the enterprise's supply chain, it is necessary to study current situation of business process. This is called the AS-IS model business process mapping. This can be done by investigate and collect information from business document, business rules, operation observe and manager and related employee interview including business partner from downstream to upstream. This model describes information exchange and decision making in all processes in supply chain. The business process model consists of material and product flow (Physical Flows) and information for material and product management (Information Flows). After mapping the AS-IS model, the reengineering phase begins. This is to indicate characteristic of problems, symptoms of problem, bottle neck and any missing links in supply chain. Then an appropriate business process is designed. This is called the TO-BE model.

One of the business process mapping tools used in this study is the Integration Definition (IDEF) methodology (Feldmann, 1995). It was initially intended for the use in systems engineering. The IDEF methodology provides a disciplined way of graphically describing the detailed structure of processes and how they relate to one another. Tatsiopoulos *et al*. (2002a) analysed and modeled a clothing industry. They modeled the existing system (AS-IS) by using the IDEF0 technique. The business processes and their activities as well as the necessary resources to operate them were analysed. Then the design of the new system (TO-BE) started with the elaboration of both IDEF0 and IDEF3 diagrams and ended with runs of the simulation model of the future business process with ARENA simulation program. Tatsiopoulos *et al*. (2002b) proposes a structured methodology for the evaluation of alternative E-commerce enabled business process reengineering (BPR). They carried out the business process modeling with the use of IDEF0 and IDEF3 activity modeling tools. They proposed that an appropriate methodology for envision and analysis of the existing system is IDEF0. They also recommended IDEF3 and simulation with activity based costing for the design of the new system purpose.

On the other hand, many researchers have applied simulation to design, investigate and evaluate supply chain strategies and operations. Berry and Naim (1996) showed the use of simulation to describe the dynamic implications of various supply chain redesign strategies adopted by a major European manufacturer of personal computers. Reiner and Tricka (2004) pointed out that an analysis of a supply chain must be very specific. They developed a discrete event simulation to analyze performances in different supply chain strategies. Wasusri *et al*. (2004) used a discrete event simulation to investigate the effect of uncertainties in an OEM textile company's sport shirt supply chain.

3. SUPPLY CHAIN IMPLEMENTATION METHODOLOGY

To study and implement supply chain concept in this case study research, we take accord to the business reengineering process. This is to begin with studying the current situations, so called AS-IS. Then an analysis is made and a new business process regarding to supply chain improvement, so called TO-BE, is recommended. To achieve this, the methodology is divided into five main processes. First of all, to set the people mindset in organization, a six-day training course on supply chain management was provided. The target trainees are from top management level to operators in production lines. This aims to get a commitment from the top management and involvement from all levels in the firm.

Secondly, to understand the current situations in the chain, an interviewing phase is necessary. The purpose of this step is to gather information from an individual who possesses expertise considered important to both order process mapping and technology analytical effort. The primary data gain in this research come from an in-depth semi-structured interview in yarning, fabrication, dyeing and garment industry. A series of interviews were set for three client groups. The first interview was conducted with upper-level management to gather the firm's overview information. Subsequently, multiple interview sessions were carried out with lower-level operations to get detail process information. In addition, mid-level management was also interviewed twice for each section to bridge any information gap.

The interview questions are set according to the SCOR's five key element processes. This is to investi-

gate plan supply chain, plan source, plan make, plan delivery, plan return, sourcing method with conditions and constraints, making method with conditions and constraints, delivery method with conditions and constraints, return method with conditions and constraints, information flow and management, current information technology used Thirdly, a business process mapping by IDEF0 was created. The goal is to convert the company primary data into the AS-IS model which represents the current state of the operation that has been mapped, without any specific improvements or changes to existing processes. To write properly structured text, the major information sources are from the detailed interviews and data-gathering from the company documents including ISO document. Also at this stage, a task analysis with swim lanes diagram is used in order to reflect an overall operational link and task relations between functions. After the current situations are mapped in the AS-IS model, together with the interview results, problem areas are identified. This can be done by analyzing the interview results and estimating lead time in each process map by tracking past orders. The components of customer lead time tracked are presented by using Gantt chart. After all, an analysis has been made based on the information gained from the interview and the business process modeling tools. Then a TO-BE model with an action plan for supply chain improvement is recommended. Finally a discrete event simulation modeling comes into play. This is to investigate the effect of uncertainties in an OEM textile company supply chain between AS-IS and TO-BE models. Fig. 2 summarises the implementation methodology.

Our case study composes of four textile companies. The first research case study comes from one of the largest group of textile industry in Thailand which is an OEM and mainly produces made-to-order products. This textile industry consists of four business units in the chain: yarning, fabrication, dyeing and garment. Finished goods from each unit are supplied to both within group and external customer. The second case study is one of the largest groups of underwear industry in Thailand. This is also an OEM and supplies both local and export. This company consists of three units namely fabrication, dyeing and garment. The third group is a medium size children wear manufacturer. There are two units: fabrication and garment in this OEM group. The fourth case is also a medium size fashion shirt industry. This group owns only garment industry. They play an OEM role for export product but also have their own brand in local market. In each case, we spent about 325 man days for data collection and 90 man days for analysis. There are 10 researchers and 30 research assistants involved in this project.

4. FINDINGS

The findings from our investigation on the four case studies are given in this part. The problems found have something in common such as long sourcing lead time, a lack of information sharing and unable to meet with the delivery lead time. The comprehensive conclusion on the Thai textile supply chains' typical status will be presented on the next part.

4.1 Case Study A

From our primary interviews, it is found that, at the strategic level, the whole organization is managed separately. The whole chain is divided by profit centres of yarn manufacturer, fabric manufacturer, dyeing process manufacturer and garment manufacturer. The top management explains that the profit centre management allows them to decentralize the authority and results in quick and convenient decision making process. However this strategy does not encourage a holistic view of operations. Each business unit (BU) sees themselves as an independent company and treats other business units as their external customers or suppliers. Moreover the top management only measures the organization performance based on cost. Other indirect costs created by non value added activities such as lack of information, unlink information and opportunities lost are not considered. The lack and unlink of information of the supply chain leads to the average of 34 days for total

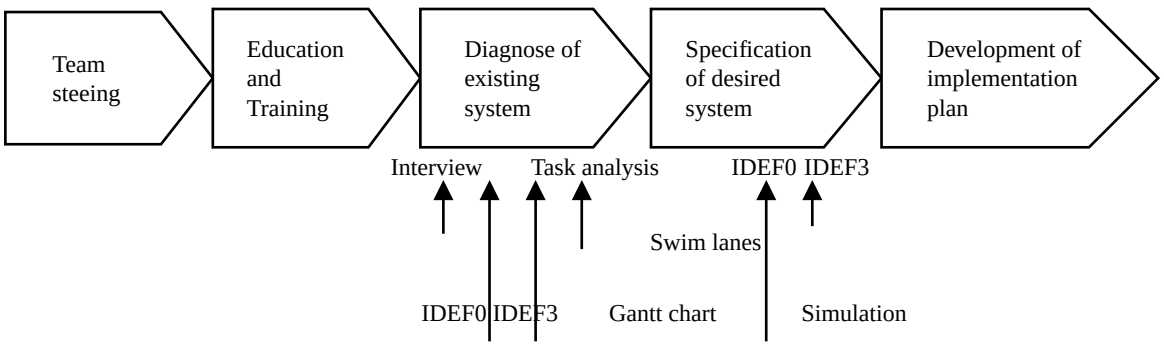

Fig. 2. Methodology and tools for implementing supply chain

sourcing time and the average of 31 days for sewing processes. The sourcing time starts after official orders arrived at the garment manufacturer. Although the customer had sent monthly forecasts on volumes and colours to the garment, those information never forwarded to the supply chain. It can be seen that the total sourcing lead time of this case study is about 50% of its total order lead time. The yarn, fabric and dyeing process manufacturers could reserve their capacity or having a better production schedule that could reduce the sourcing lead time if the information had been shared.

It is then found that no information on capacity, raw material availability and master production schedule are shared. This leads to the problem of overstock and double work. Apart from this, double inspection often occurs even though they are under the same company. For example, although they use the four point system standard to inspect the fabric, the garment BU needs to inspect the fabric again at the material receivable stage in spite that the grey has already been inspected at the departure from the fabric BU. The double inspection wastes the total order lead time by 2-3 days. As a result of the unsynchronized supply chain, the supply chain on time performance is as low as 50%.

4.2 Case Study B

Case study B is also an OEM. The whole chain of this textile group is divided by profit centres of fabric manufacturer, dyeing process manufacturer and garment manufacturer. Each business unit is then managing themselves as an independent company in order to maximize their own profit. The supply chain activities could start after merchandisers at the garment manufacturer get orders from agencies. Performance measurement cannot represent the effectiveness of supply chain management as functional based measurement is applied. Cost is the main performance measure being used. It leads to having suppliers who usually late deliver the raw materials. Not a question, supplier evaluation process or supplier improvement never started yet.

It is working like external suppliers along the supply chain and there is no information linkage between BU. Double entry data during the order fulfillment process is normal as they are using different systems and never get interfaced yet. As a result, the order fulfillment process is not integrated. Long sourcing time is also found at the garment manufacturer because the upstream manufacturers never involved in the product development process. This case study achieves only 20% on time performance. The average lateness of the case study to its customers is around 40 days. The lateness occurs at the sourcing process, the average of lateness of fabric and accessories sourcing process is about 20 days. Moreover, the supply process is very unstable. Its average total sourcing lead time is 86 days and it could be high up to 207 days. An effective production planning cannot then be achieved because of the high uncertainty of supply process. The production can be started when all materials are available at the receiving store. Then, Earliest Due Date Assignment (EDD) is used to sequence the job orders. It might then lead to quality problems during the production because the sewing manufacturer would need to make the orders done as soon as it can. The average of total lead time is 96 days and its maximum total lead time is 218 days. It can be said that total sourcing lead time has a high impact on the chain's time performance.

4.3 Case Study C

Case study C is from a medium textile group. Two business units connect as an internal supply chain that are fabric manufacturer and garment manufacturer. The two business units are independently managed without integrating their information and production plan. Performance measurement of the two business units are cost. Merchandisers at the garment manufacturer are the focal point of the supply chain as they collect all information from customers. They then start the supply process along the chain by placing purchasing orders to the fabric manufacturer. After placing the purchasing orders, the garment manufacturer only waits for the raw materials. The production planning division at the garment manufacturer will follow up the purchasing orders when it is near to the shipment date. However, the raw materials usually come late. The supplier improvement or evaluation program is not applied yet. Earliest due date is then used to sequence the job orders that their raw materials are available at the receiving store. In addition to these, lead time used to book capacity is an universal standard lead time. The standard lead time is used for every order which leads to unable to finish some job orders on time because the standard lead time is different relating to style and fabric specification. The average total order lead time is 293 days and around 50% of the total order lead time is the sourcing lead time. The high sourcing lead time is occurred as there is no real purchasing process to evaluate, monitor and follow up its purchasing orders.

4.4 Case Study D

Case study D is a small garment manufacturer. It is having problems with long sourcing lead time due to customers' postpone management and information jammed at merchandisers. The customer information at the merchandisers can not be quickly distributed to purchasing division and production division as software being used in the factory is not totally linked. Double entry data along the order fulfillment process is normally found. Moreover, the merchandisers do not totally understand what the purchasing and production divisions want to know in order to establishing Bill of Material

(BOM) and reserving capacity effectively. Production planning at the garment cannot be done unless the raw materials are gathered at the receiving store because of very high uncertainty in supply process. Earliest due date is utilized for the job orders that their raw materials are available. Sewing process was pointed as a bottle neck process while it is not true. The bottle neck process is found at the pattern making process because there is no modern tool applied in this process. Every morning talk is taking place to sequence and monitor the job orders. Its average total sourcing lead time is 60 days and average sewing lead time is 30 days. It can be seen that total sourcing lead time plays more important role than production lead time.

Examples of the IDEF and Swimlane diagram used to analyse the supply chain are shown in Figs. 3 and 4, respectively. It shows the relationship of information flow in internal supply chain. The swimlane diagram presented here also reflects the information bottleneck of the chain. From most cases, it can be seen that information has to be bounced back to merchandiser from most of the departments in the chain.

5. TYPICAL PROBLEMS IN TEXTILE SUPPLY CHAIN

From the case studies, we classify the problems in to 6 main aspects. They are raw material sourcing, information management, production and inventory, performance measurement and organization structure and responsibility.

5.1 Long Sourcing Lead Time

Long sourcing lead time is occurred in every case study and it is a major issue destroying competitiveness advantage for all textile industry. From our observation, we founded that more 50% of total order lead time was spending for sourcing materials. There are many types such as fabric, accessories, packaging and labels. Those materials have to be authorized by their customer before production process can start. The reasons are that suppliers are pointed by their agencies and supplier evaluation or improvements have not properly implemented. In addition to these, suppliers have not integrated since the product development process.

5.2 Information Management

Information technology used in the case studies can be divided into 2 groups relating the company size. For Large size company, Enterprise Resource Planning (ERP) packages such as SAP or Oracles are used. However, the package used may not cover for all process starting from order receiving to order shipment. It mainly used for monitoring inventory and production planning. Moreover, there is no integrated information shared

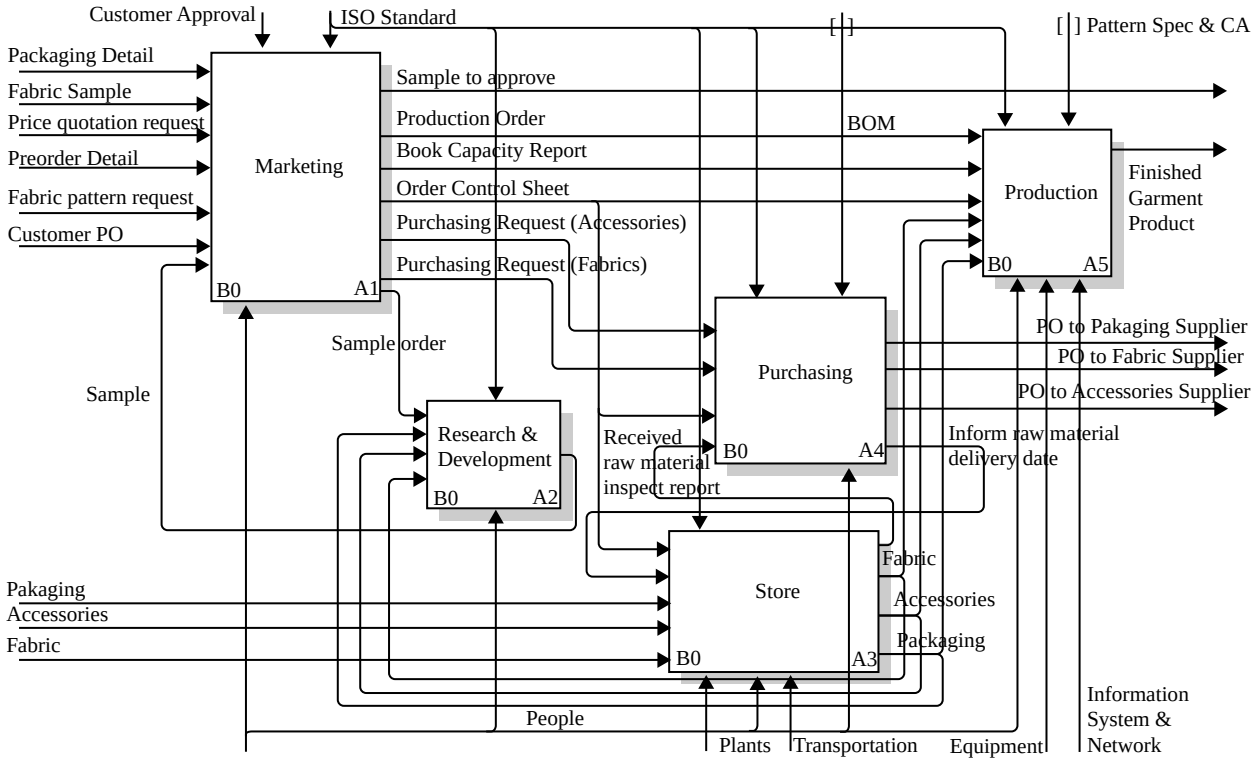

Fig. 3. Information flow in supply chain represented by IDEF0

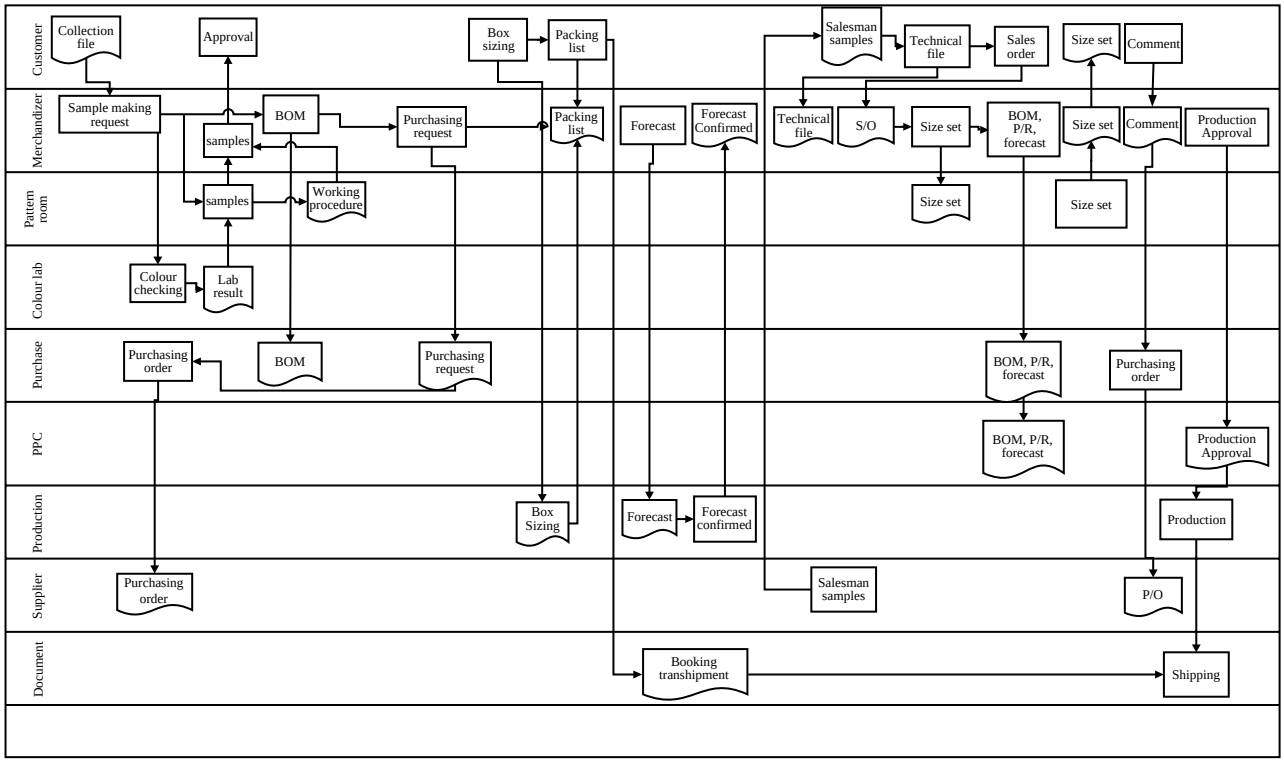

Fig. 4. Information flow in supply chain represented by Swimlane diagram

between business units because each business has its own data based systems and they are not interfaced. EDI has not been implemented yet. Order entry must be done every time when each business unit gets a purchasing order. The status of customer order is difficult to monitor because the result of work has not been updated real time. Production planning between business units is then invisible.

For small size company, ERP packages are not in place yet. Microsoft excels or words are being used. Mostly, information is collected in hard copies. Therefore, it is very difficult to track or bring data for analysis in order to improve their process. When it comes to supply chain management, the small size company does not have facility to share important data such as master production schedule and order specification with its suppliers. Monitoring the process is even hard because ways to monitor the process are to make a phone call or walking into the production process. Unfortunately, the monitoring process would apparently start about 30 days before shipment date.

5.3 Production and Inventory

For production and inventory issues, we found that small and medium size manufacturers are having more trouble comparing to large size manufacturer. The possible reason is that larger size manufacturer has better production database system such as accuracy standard time, bar coding at inventory and using software to establishing the production planning. At the same time, the small and medium size manufacturers are wrongly to identify the bottle neck process. There is no information technology using to control inventory and also establishing the production planning. Moreover, production planning and control cannot be done because highly uncertainty in supply process due to merchandisers. Merchandisers are doing three main jobs at the same time that are product development, receiving customer orders and placing purchasing orders. As there is no information technology to support those activities, the information slowly and sometime might be wrongly flow from the merchandisers.

5.4 Performance Measurement

Every case study was found that they are using functional based performance measurement. The measurement cannot represent the supply chain performance. Moreover, cost is the only measure that is being used. Moreover, one business unit could have their different lead time for measuring their performance. For example, due date used in production department and shipping department is different although it is from the same order. In other words, each department has its own due date for each job and its due date may not properly relate to customer request date or customer commitment date. The main reason is that they are working as a functional based basis.

If they can finish their jobs within 10 days, they would meet the target. Although they could finish their jobs in 10 days, the jobs may be late delivery.

6. DISCUSSION

From the current situations, it can be summarized that four areas need to be improved. These are:

6.1 Organisation Structure

Based on the profit centre strategy that the company applies at the moment, this causes an organisation independent management and no linkage between BU. There is no order priority given to the internal suppliers or customer. All customer orders are treated the same by first come first serve (FCFS) rule. End customers of the chain are not recognized.

We propose that new management strategy should be implemented. This is to treat each order as a project along the chain. Each BU could see the status of each order throughout the entire chain. The garment BU should acknowledge the fabric BU about the forecasting details from customer. Then the fabric BU can build grey stock or reserve capacity for the internal customer in advance. Moreover the performance measurement system should be set to an end customer project based measurement.

6.2 Business Process

Obviously, there is no synchronized plan between BU. From upstream to downstream, the production activities run sequencingly based on day to day operations. Each BU has its own production plan which is unsynchronized to others. Frequently, the cutting and sewing production schedule do not match with fabric arrival schedule. This results in work in progress and delay time. One option for managing this problem is called Supplier Relationship Management . SRM can be applied in various ways such as supplier development, integration of suppliers and strategic supplier portfolio monitoring and control (Wagner and Johnson, 2004). Choy *et al*. (2003) also noted that SRM is a new category of supply chain applications. It contributes to the supplier selection and increases the competitive advantage of the manufacturer. If suppliers could send raw materials at right time, right place, right quality and right quantity, the following activities that are production planning, inventory control and quality control can be effectively achieved.

The case study B is badly affected by sourcing lead time and we conducted simulation to quantify what-if analysis on having supplier evaluation system, supplier monitoring and supplier relationship management with fabric and accessories suppliers. It was found that the AS-IS strategy lead time takes around 96 days. If SRM program could be implemented, the on time performance will be increased by 20% when the sourcing time lead time could reduce 30% (Kritchanchai and Wasusri, 2005). Moreover changing business process for case study C by having specific standard time for each customer orders and having better information flow along the supply chain, the total lead time could be reduced by 15 days.

6.3 Information Management

There is no integrated information shared between BU. Each BU has its own database and information system. There is no information linkage and sharing especially for supply chain planning. We propose to set up a supply chain planning centre (SCPC). The objectives of setting up the SCPC are to have a global plan for the supply chain, to monitor status of orders and to set up a supply chain database. The global plan is established by the supply chain planning center and it is a rough plan. It gives lead time for each BU to finish its production and the lead time is based on agreed standard lead time. When the global plan is launched, BU will establish its own local production planning in order to start its production that can meet with the lead time given. If BU can not follow the global plan, the BU has to report to the SCPC. The SCPC will then rearrange the global plan according to customer lead time. At the same time, the results of production at each BU will be shown on the global plan. The Fig. 5 shows the relationship between global plan and local plan and the Fig. 6 shows the global plan.

Not only the global plan and the supply chain production status can be monitored, the supply chain database is also set up. The data base is consisted of product

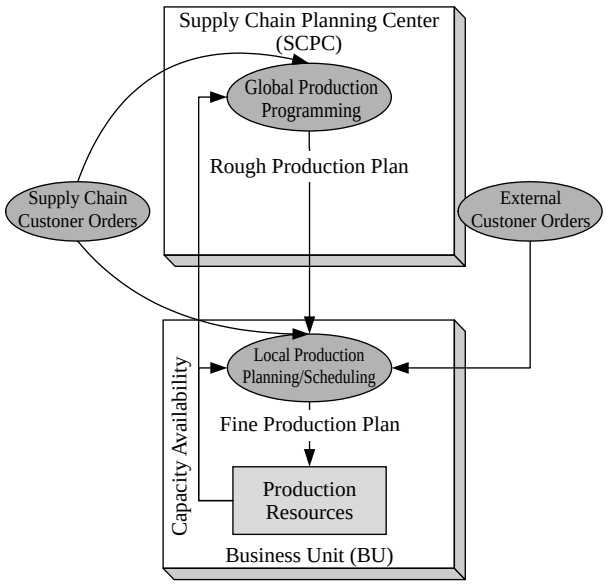

Fig. 5. Relationship between global plan and local plan (Thailand Textile Institute, 2004)

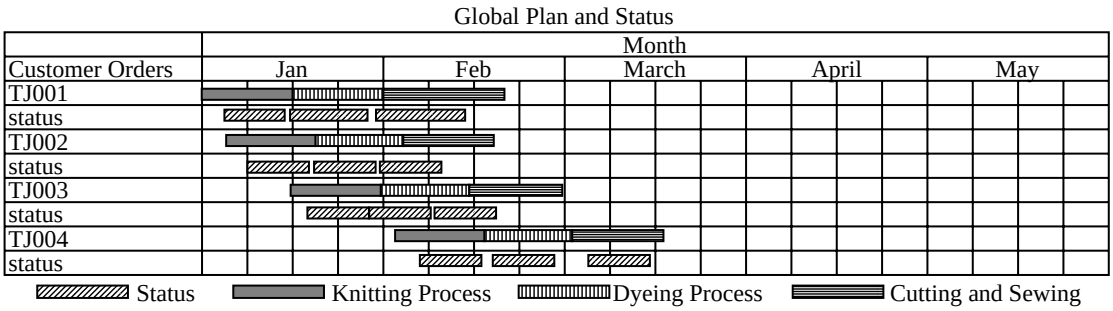

Fig. 6. Global plan

data, customer data, supplier data, cost data, production resource data etc. We also conducted simulation investigating the impact of having a good planning system and information linkage along the supply chain of case study A. It was found that the average total lead time could reduce from 65 days to 50 days (Wasusri *et al.*, 2004).

6.4 Knowledge Management for Decision Making

Historical data is not analysed and interpreted effectively. Forecasting can be more accurate if information is shared between BU. Capacity and stock can be sufficiently and appropriately provided at the right buffer position in the chain. We propose to set up a knowledge based management by using the data from the supply chain database. Case Based Reasoning (CBR) is recommended to be used to analyse behaviours of customer orders such as booking amount by customers, real order amount, yarns used, colours used and supplier records. Moreover, CBR is also applicable for setting up dyeing factors which is problematic for dyeing factories. After implement the knowledge based management, uncertainty in demands -affected by forecasting errors-, supply-affected -by supplier quality and production processes -affected by production constraints- can be reduced.

7. CONCLUSION

From our findings, we have found that the supply chain problems occurring in the case studies are different relating to size of the case study. If it is a small size factory, internal supply chain activities such as production planning, information system, and inventory control and warehouse management are main problems. It is thus necessary to have a good practice on industrial management. Information flow in order to obtain a good production planning system is the first priority for the small size textile industry. If it is possible, ERP should be in place to provide visibility of the factory. However, quality issues are also high priority to meet customer satisfaction. At the same time, Supplier Relationship Management and Customer Relationship Management should be established. Business rule should be agreed between the company and the supplier. It is ineffective to be an OEM, but it is very difficult to be an Original Brand Manufacturer (OBM). Therefore, improving design ability as a Original Design Manufacturer (ODM) might gain competitive advantages. For larger companies, good information flow has already been in place, but it is not linked between the business unit. The main reasons would be incompatible or they are not trust on each other. Although production planning and inventory control were seen as problems, the ways of solving this problem are clear that is collaborative planning and replenishment forecast. They have not solved the problem because they have not collaborated each other. Profit centre system is main barrier leading to uncooperative between business units. We conclude here that, under the pressure from free trade, supply chain concept can be a key competitive approach in textile industry. It provides ways to reduce lead time, hence, increase competitive advantage in the world market. Nevertheless the role of Thailand textile industry in the global supply chain needs to be reconsidered. We should not, any longer, position ourselves at the OEM position only. The business process environment, which allows the agency taking customer order for us, should no longer apply. We may need to expand our role in the chain in both ways -upstream and downstream. To upstream side, we may need to expand our role to the ODM and compress lead time in this phase. To downstream side, creating opportunities in contacting end customer directly could help reducing our customer lead time. Lastly, information technology with web application has a very high potential in enhancing supply chain performance in this global competitive market.

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