



INVENTORY REDUCTION THROUGH POSTPONEMENT
STRATEGY: A CASE OF THAI FELT CO., LTD.

By
PARICHAT SUPAPHOL

A Final Report of the Six-Credit Course
SCM 2202 Graduate Project

Submitted in Partial Fulfillment of the Requirements for the Degree of
MASTER OF SCIENCE IN SUPPLY CHAIN MANAGEMENT

Martin de Tours School of Management
Assumption University
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Declaration of Authorship Form

I, Parichat Supaphol

declare that this thesis/project and the work presented in it are my own and has been generated by me as the result of my own original research.

Inventory Reduction Through Postponement Strategy: A Case of Thai Felt Co., Ltd.

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(A. Thanapat Panthanapratez)

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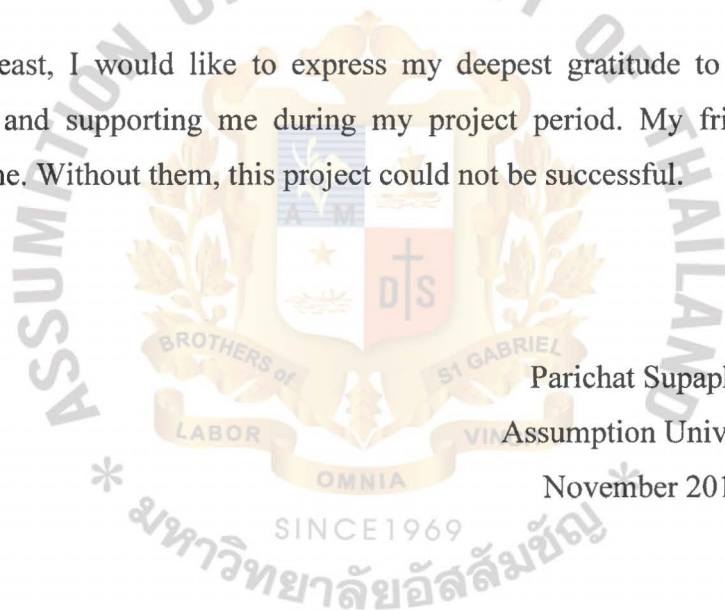
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Parichat Supaphol
Assumption University
November 2011

ABSTRACT

In global competitive business today, one of the success factors that companies concentrate on is inventory. In order to achieve a customer service level at minimum cost of ordering and holding inventory, the company searches for appropriate strategies that could reduce excess inventory level. The purpose of this study is to enhance knowledge and awareness of applying purchasing postponement strategy and to study the technique of how to minimize inventory level and improve purchasing efficiency. This paper identified the opportunity to reduce inventory amount by proposing a new working process flow. Excel spreadsheet was applied to find out cost saving. The consequences of purchasing postponement are measured and analyzed in terms of total inventory cost saving, and number of inventory day reduction. Finally, the company can save inventory amount of 0.81 million baht in total or 92.74% per month. In addition, it can reduce inventory days from 13.2 days to only one day.

Applying purchasing postponement to the company as a strategic tool to improve their supply chain network and working process as well was implemented. This strategy improved purchasing efficiency, reduced inventory amount and warehouse space which effect inventory days. I expect that the company will obtain the benefits of adopting this technique.

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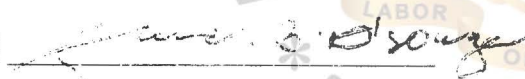
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Ms. Parichat Supaphol

and she hereby certifies that the verbiage, spelling and format is commensurate with the quality of internationally acceptable writing standards for a Master Degree in Supply Chain Management.

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Date: 11/11/2011

CHAPTER I

GENERALITIES OF THE STUDY

Purchasing is a major function of an organization that is responsible for acquisition of required materials, services and equipment (Leenders & Flynn, 2002). Purchasing is viewed as one of the strategic keys contributing to the success of many organizations as any other functions such as marketing, finance, engineering, accounting and operations (Burt, Dobler, & Starling, 2003). Specialized knowledge in technical fields and relationship management are essential. However, the views of purchase and supply activities may vary from organization to organization depending on the nature of a company and the top management perspectives.

Nowadays, the roles of purchasing emphasize on supplier development, cooperation and trust for building a long term relationship. The transition which enables us to manage supply chain effectively and efficiently requires a great contribution from the purchasing function. The purchasing role becomes more complex which involves other related parties, not necessarily only suppliers but also with other business functions inside the organization. The strategy has been applied to many organizations from small to medium and large organizations.

The postponement's concept is reduced need for inventory, increased responsiveness by shortening the final customizing cycle time and reduced complexity in operation (Hoek, 2001). The most important subject that many companies in every business pay attention to is how to run the business with minimum cost and have most efficiently. It has been shown in surveys that 71 percent of companies pay attention to the subject of cost control and cost reduction (Cooke, 2002). Efficient inventory management is the significant factor that helps companies achieve to the goal of cost reduction. The right amount of inventory can increase stability level of customer satisfaction. Because inventory can mean profit or loss in the company's financial statement, therefore, every company tries to find the best way to deal with inventory.

Consequently, this paper aims at defining purchase and supply strategy for the purchasing department of Thai Felt Co., Ltd. The case of Thai Felt has been selected because its product's reputation does not seem to be very recognized in the market.

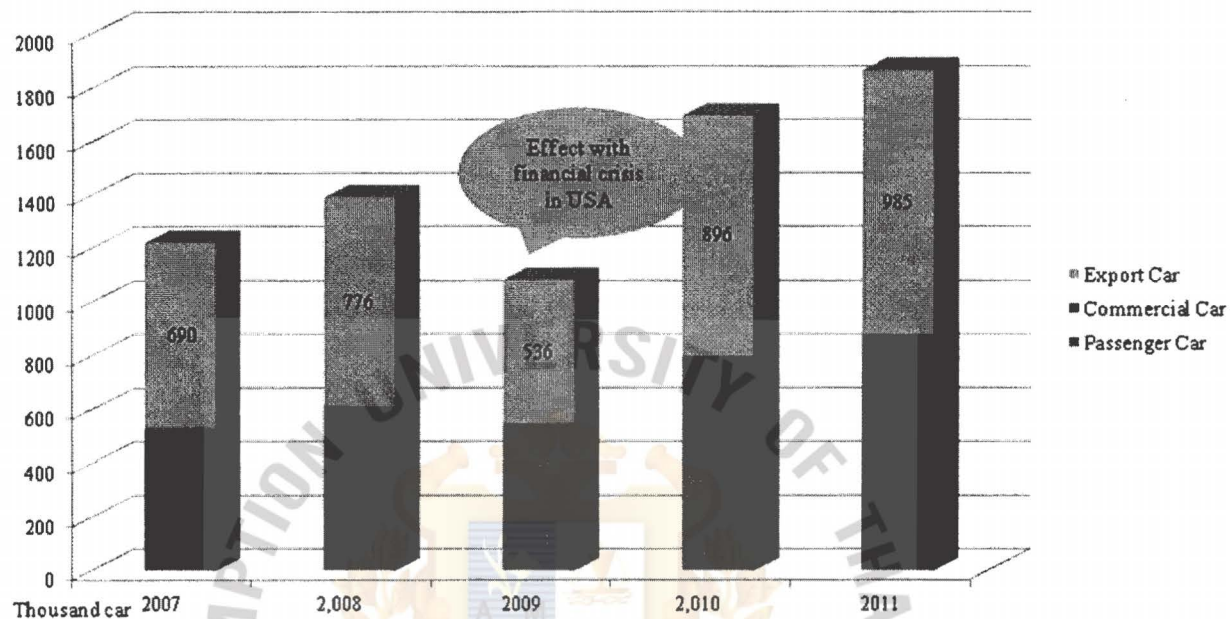
1.1 Background of Thai Felt Company

Thai Felt Co., Ltd. is Japanese company specializing in manufacturing Felt and Rubber product for automotive and air-conditioner industries. It located in Amatanakorn Industrial Estate, Chonburi. The company was founded in August 2004 with a registered capital of 130 million baht with eighty-five employees. The technology, machines and knowhow have been supported by Japanese shareholder in Japan. Its main customers are Japanese manufacturing companies which are tier 1 suppliers of automotive companies such as Toyota, Honda, Mitsubishi, Nissan, Suzuki, Isuzu, Auto Alliance Thailand, General Motor (Thailand).

Thai Felt products are two types. Felt that is made of cotton which is mixed with chemicals and pressed into customer's specification. Another one is Rubber that made of chemicals mixed, then pressed and cut according to specifications of customer's size. Material grades are specified by customers and purchased from Thai trading firms who import directly from manufacturing companies in Taiwan, Japan and USA. Some materials are made in Thailand which suppliers located in Ratchaburi and Chonburi.

The automotive industry in Thailand has growth and continuous development and become the main industry. Production's trend in Thailand are increasing every year and details are shown in Figure 1.1.

Figure 1.1 Production Volume of Automotive Industry in Thailand

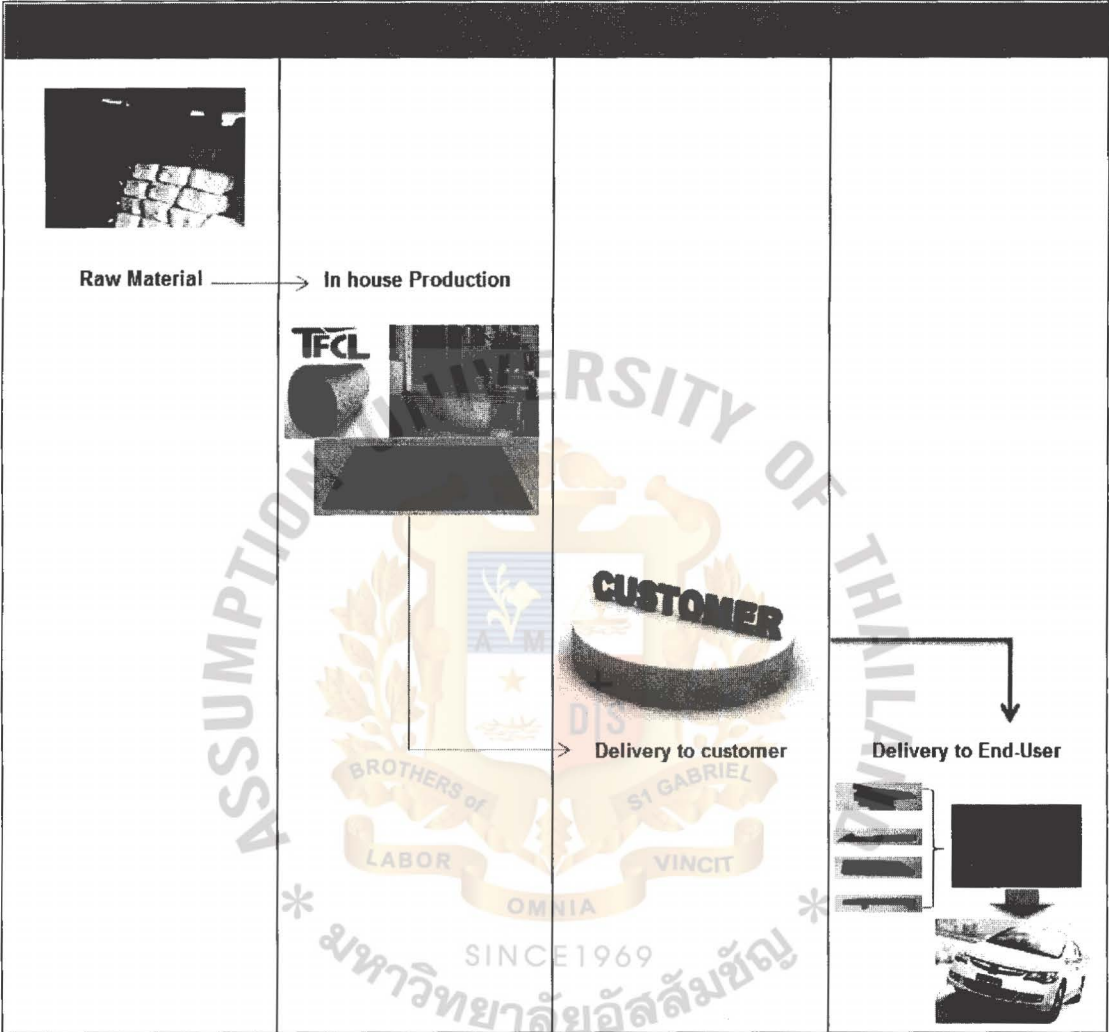


Source: Shared by Managing Director of Thai Felt Company

Figure 1.1 indicates the production volume of Automotive Industry in Thailand is increasing every year and separated by three types of cars. Export cars have the most volume followed by commercial cars and passenger cars. The production volume decreased in the Year 2009 because of the financial crisis in United States of America. In the year 2010 and 2011, the production volumes increased. The company produces and supplies products to automotive industry. This information is used to prepare raw material, maintenance of the machines and support the high-growth volume.

Thai Felt products have many types of finished goods; for example; Felt Roll, Felt Press, Felt with Rubber and press. In order to support customer's requirements, the company keeps inventory for the customer 2.5 days and guarantees production lead time within one day.

Figure 1.2 Supply Chain Mapping of Thai Felt Company



Source: Thai Felt Company

Figure 1.2 indicates that supply chain mapping input process starts from materials supplied from suppliers. These main materials are purchased from Thai trading firm who imports directly from abroad and local sources. The products will be manufactured in house and delivered to customer which are tier 1 supplier of automotive companies.

1.2 Statement of the Problem

From financial records, inventory cost of the company is high every month. The researcher would like to find out the factors that make inventory levels high and propose the solution to solve it. In this paper, the researcher focuses on raw material inventory because it is 55% of the total inventory. The average inventory per month is 3.5 million baht. The problem occurs because the purchaser lacks knowledge of push-pull delivery. They purchase material based on production forecast and do not compare it with actual quantity in each month. Also they are not aware of high inventory levels and do not negotiate with the suppliers in order to hold unnecessary shipment. Another problem which is uncontrollable of raw material is because of the space in warehouse. As the company has limited space to keep raw material inventory, the researcher intends to use this opportunity to solve this problem by doing this project.

The researcher would like to improve efficiency of purchaser and gain maximum benefits for the company. This study aims to answer the main research problem of “How can purchasing postponement strategy be used to reduce raw material inventory?” In order to answer this question, the research objectives are set up.

1.3 Research Objectives

This paper focuses on purchasing strategy that could reduce the inventory cost of raw materials. So, the objectives of this project are as follows:

1.3.1 To identify inventory level of raw material.

1.3.2 To create new purchasing working process flow according to purchasing postponement strategy.

1.3.3 To illustrate benefit of purchasing postponement by comparing inventory day and its cost through purchasing postponement.

1.4 Scope of the Research

This case study focuses on a purchasing method that needs to review and propose a new working process flow for the purchasing department. In order to control and minimize the inventory level, the researcher collected the historical data starting from January 2011 – June 2011. Purchasing postponement strategy and purchasing postponement's scenario will be analyzed. Purchase lead time will be used for segmenting. The inventory control problems are analyzed and solved by using new purchasing method. This criteria used for the case study can help to control inventory levels and improve purchasing efficiency.

Literature review in this study supported the new purchasing strategy. Literature review shows that inventory levels can be minimized by using historical data gather from in-depth interviews and document reviews. This is a suitable purchasing method to the company.

1.5 Limitations of the Research

This research analyzed three groups of the company inventory which is raw materials, finished goods and work in process. However, to be able to evaluate the generality of the results, several characteristics that present limitations of this paper are identified.

1.5.1 This research focuses on cost saving of raw material.

1.5.2 Benefits of the purchasing postponement strategy are excluded the item code FA-08 and FN-01 due to their operation complexity.

1.6 Significance of the Research

This understanding of purchasing importance has led the company to seek a competitive advantage derived from supply chain activity enhancement. The right strategy can reduce excess inventory and can considerably minimize the capital losses of the business. This study aims to reduce inventory cost of raw material by applying purchasing postponement strategy.

Purchasing postponement is studied to solve the problem of the company in order to supply material items at the required quantity and time. To manage inventory is important because it can make the company get high or low profit. It could be a guideline for other purchasers, management teams, and other companies to improve their businesses. At the end of research, the researcher expects that the company will obtain the benefit of this adoption.

1.7 Definition of Terms

| | |
|---------------------|--|
| Automotive industry | The manufacturers carry out the process of automotive. It starts from designs, develop, produce and sell. (Wikipedia, 2011) |
| Part Delivery Sheet | Data which contains material name, quantity and requested delivery date one day in advance. The purchaser creates this sheet and send to supplier. |
| Postponement | The strategy which uses delays in the final manufacturing or assembly process until the exact timing needed. An example of postponement is delaying the arrival of materials until the production date requirement (Hoek, 1998). |

| | |
|-------------------------|---|
| Production volume | The quantity that is set, to produce the goods of the company. |
| Purchasing postponement | To postpone the purchase of incoming components or raw materials until demand is known. (Yang, Yang, & Wijngaard, 2007). |
| Rolling Forecast | A forecast for sales, or for costs, but more often than not for both, that always extends a set number of financial periods into the future (Clarke, 2007). |



CHAPTER II

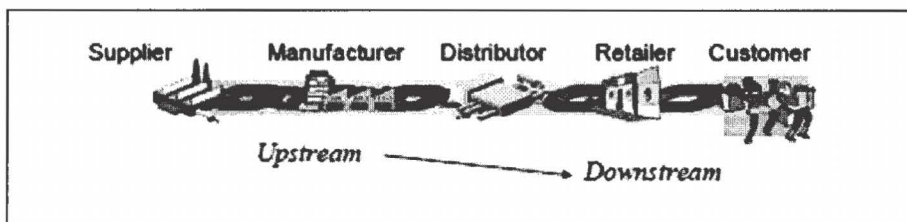
REVIEW OF RELATED LITERATURE

The review of related literature can provide ways to define the root cause of inventory problems, and could be guideline of what practices or theories are suitable for the company's methodology. First of all the supply chain is the network of organizations that are involved, through upstream and downstream linkages in the different processes which starts from the supply of raw material until products or services are in the hands of the ultimate consumer. Identifying postponement strategies to reduce inventory problems with proven record are in previous studies from many researchers. Lastly, focus on purchasing postponement strategy which can be applied to reduce access inventory. The details processed in the following parts.

2.1 Supply Chain Management

Supply chain management is the management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole (Christopher, 2007). The aim of supply chain is to match supply and demand, make profitably for production and services. Figure 2.1 show supply chain factors which consist of suppliers, manufacturers, distributors, retailers and customers.

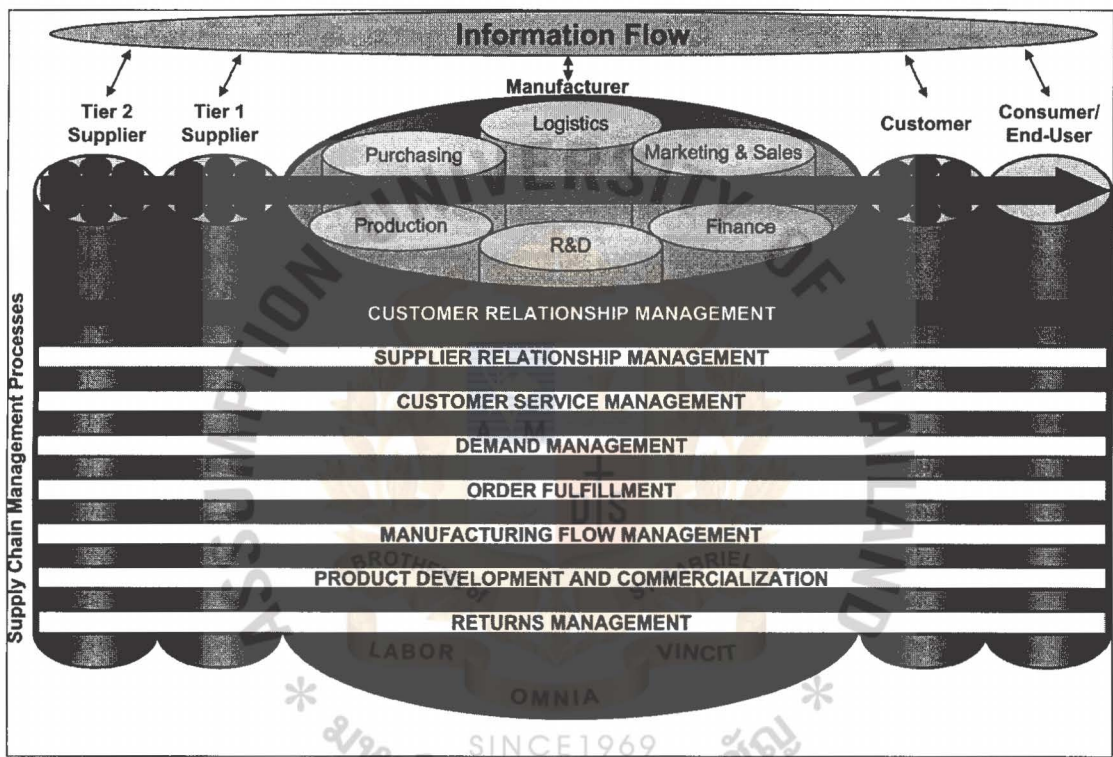
Figure 2.1 Supply Chain Factors



Source: Author

Supply Chain Management is the integration of key business processes from consumer or end-user through suppliers that provides products, services and information that add value for customers. Figure 2.2 show supply chain management process.

Figure 2.2 Supply Chain Management Process



Source: Lambert, Martha, Cooper, & Pagh (1998)

According to Figure 2.2 the process of supply chain management is related with eight activities below;

2.1.1 Customer relationship management provides the structure for how the relationships with customers will be developed and maintained. Management identifies key customers and customer groups to be targeted as part of the company’s business mission. The goal is to segment customers based on their value over time and increase customer loyalty by providing customized products and services.

2.1.2 Supplier relationship management is the process that defines how a company interacts with its suppliers. The company needs to develop relationship with its suppliers. Supplier relationship management is about defining and managing these product and service agreements. Long-term relationships are developed with a small core group of suppliers. The desired outcome is a win-win relationship where both parties benefit.

3688 e.1

2.1.3 Customer service management is the company's face to the customer. It provides the key point of contact for administering the product service agreement. Customer service provides the customer with real time information on promised delivery dates and product availability through interfaces with the company's functions. The customer service process may also include assisting the customer with product applications.

2.1.4 Demand management is the supply chain management process that balances the customers' requirements with the capabilities of the supply chain. The process is not limited to forecasting. It includes synchronizing supply and demand, increasing flexibility, and reducing demand variability.

2.1.5 Order fulfillment process includes all activities necessary to define customer requirement and to design a network and a process that permits a company to meet customer requests while minimizing the total delivered cost as well as filling customer orders. The objective is to develop a seamless process from the supplier to the organization and to its various customer segments.

2.1.6 Manufacturing flow management is the supply chain management process that includes all activities necessary to move products through the plants and to obtain, implement and manage manufacturing flexibility in the supply chain. Manufacturing flexibility reflects the ability to make a wide variety of products in a timely manner at the lowest possible cost. To achieve the desired level of manufacturing flexibility, planning and execution must extend beyond the four walls of the manufacturer in the supply chain.

2.1.7 Product development and commercialization is the supply chain management process that provides the structure for developing and bringing to market products jointly with customers and suppliers. The product development and commercialization process team must coordinate with customer relationship management to identify customer articulated and unarticulated needs; select materials and suppliers in conjunction with the supplier relationship management process; and develop production technology in manufacturing flow to manufacture and integrate into the best supply chain flow for the product combination.

2.1.8 Returns management is the supply chain management process by which activities associated with returns, reverse logistics, gate keeping, and avoidance are managed within the firm and across key members of the supply chain. The correct implementation of this process enables management not only to manage the reverse product flow efficiently, but to identify opportunities to reduce unwanted returns and to control reusable assets such as containers. Effective returns management is an important part of supply chain management and provides an opportunity to achieve a sustainable competitive advantage

2.2 Postponement Strategy

The postponement concept has been shown in literature for over 60 years (Alderson, 1950). This concept is about delaying activities of goods until the possible period of time (Lee et al., 1993).

Postponement is used for reducing risk and inventories while the company still provides product variety and continuous support customer requirements. The benefits of postponement are to reduce inventory, reduces complexity in the production process and increase responsiveness by shortening the final customizing cycle time (Hoek, 2001).

Postponement entails the implementation of specific inventory strategies to deploy inventory farther away from the customer while fulfilling service level objectives and

reducing inventory costs and minimizing risk. The purpose of postponement is moving product differentiation to agree with the pull concept. The good benefits that will be received are decreasing lead time of raw material supply, and delay product differentiation (Fisher, 1997).

Postponement has been increasingly used as an important supply chain strategy (Yang & Burns, 2003) and it has been widely applied across the world (Yang et al., 2007). Postponement could delay activities in the supply chain and redesign business process. It could improve responsiveness, transportation, storage and obsolescence cost while reducing inventory (Yang et al., 2004).

The scope of the postponement has expanded from marketing to many functions in organization such as product development, purchasing, manufacturing, distribution and sales process (Bucklin, 1965; Bowersox & Morash, 1989). To explain the background of Postponement strategies which have many researchers have proposed the classification in Figure 2.1 can be revised.

Table 2.1 Classification of Postponement Strategies

| Author(s) | Classification of postponement strategies |
|-------------------------------------|--|
| Zinn and Bowersox (1998) | Form postponement (including manufacturing, assembly, packaging and labeling postponement) and time postponement |
| Bowersox and Closs (1996) | Logistics postponement (combination of time and place postponement) and form (manufacturing) postponement |
| Lee (1998) | Pull postponement (moving the decoupling point upstream to configure to order), logistics postponement and form postponement |
| Pagh and Cooper (1998) | Full speculation, logistics postponement, manufacturing postponement and full postponement |
| Waller, Dabholkar and Gentry (2000) | Production postponement, upstream postponement and downstream postponement |
| Yang, Burn and Backhouse (2004) | Product development postponement, purchasing postponement, production postponement and logistics postponement |

Source: Yang, Burn and Backhouse (2005)

A main distinctive principle of postponement is to obtain more actual information in order to define and translate the customer's needs into product or service specification.

Yang et al. (2007) was categorized four types of postponement strategies that can be formulated based on the state of inventories as below;

2.2.1 Logistics postponement (Finished goods), is defined as delaying activities until orders are received. It entails the implementation of inventory to deploy inventory away from the customer and reduce inventory costs (Bowersox, Carter, & Monczka, 1993). It seeks postponement opportunities in the final movement of products, which have taken their final form in advance of customer orders, to the customer. This is facilitated by the emergence of e-commerce, where virtual inventories are independent on the inventories' physical location at the time orders are placed. Internet retailers can thus manage inventory to fulfill customer orders by postponing the location of inventory to upstream supply chain echelons until the arrival of customer orders (Bailey & Rabinovich, 2005).

2.2.2 Production postponement (work-in-process), keeping undifferentiated semi-finished products for as long as possible will increase a company's flexibility in response to changes in customer demand. In addition, the company can reduce supply chain cost by keeping undifferentiated inventories.

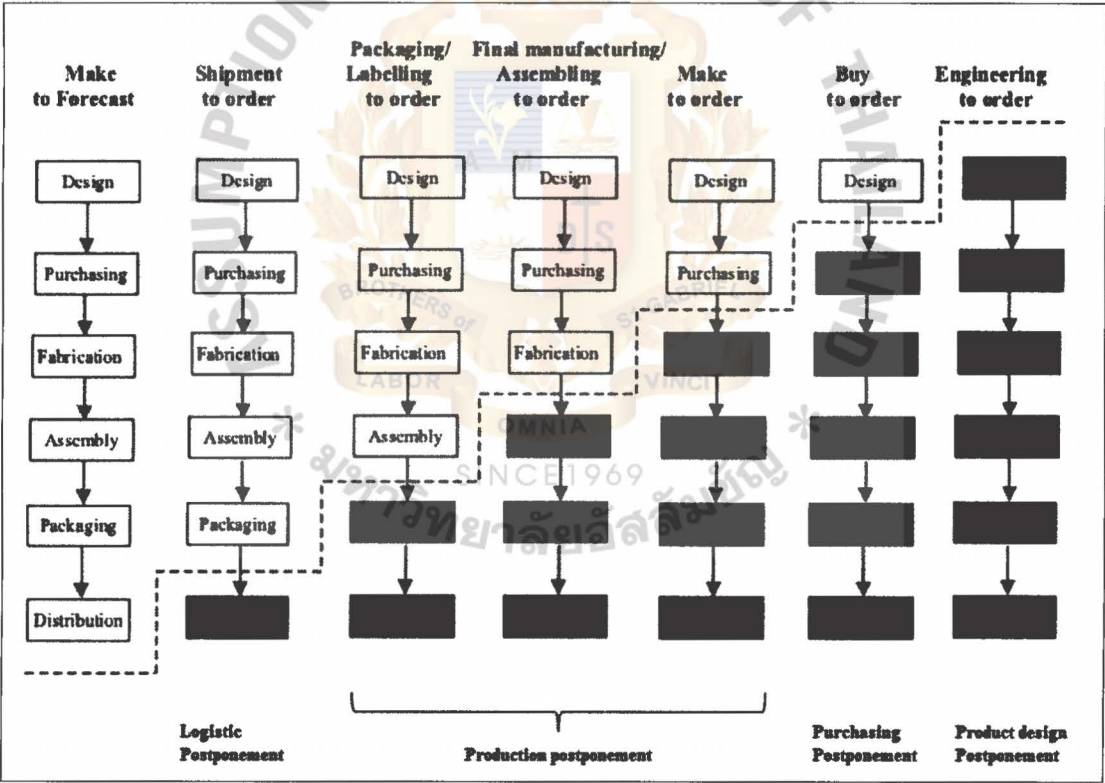
2.2.3 Purchasing postponement (components or raw materials), this strategy allows companies to postpone the purchase of incoming components or raw materials until demand is known, eliminating the risk of holding obsolete inventory in stock. The strategy is same as production postponement that allows companies to avoid building up inventories of finished goods in anticipation of future orders.

2.2.4 Product development postponement (no inventory), this stage uses technology to do a postponement base on designing. One such case is the Drive Test system from Agilent Technologies, which measures the coverage, effectiveness and quality of wireless phone base stations (Elliott & Hughes, 2000). It faces the challenge of

bringing together three different sets of rapidly changing knowledge to provide a valuable test solution for cell manufacturers and operators.

Figure 2.3 indicates the 4 types of postponement and working processes in the company. Postponement is associated with the customer decoupling point (CODP), where in the supply chain the customer order penetrates and distinguishes forecast and order-driven activities.

Figure 2.3 Speculation-Postponement Strategies and a Continuum of Standardization-Customization



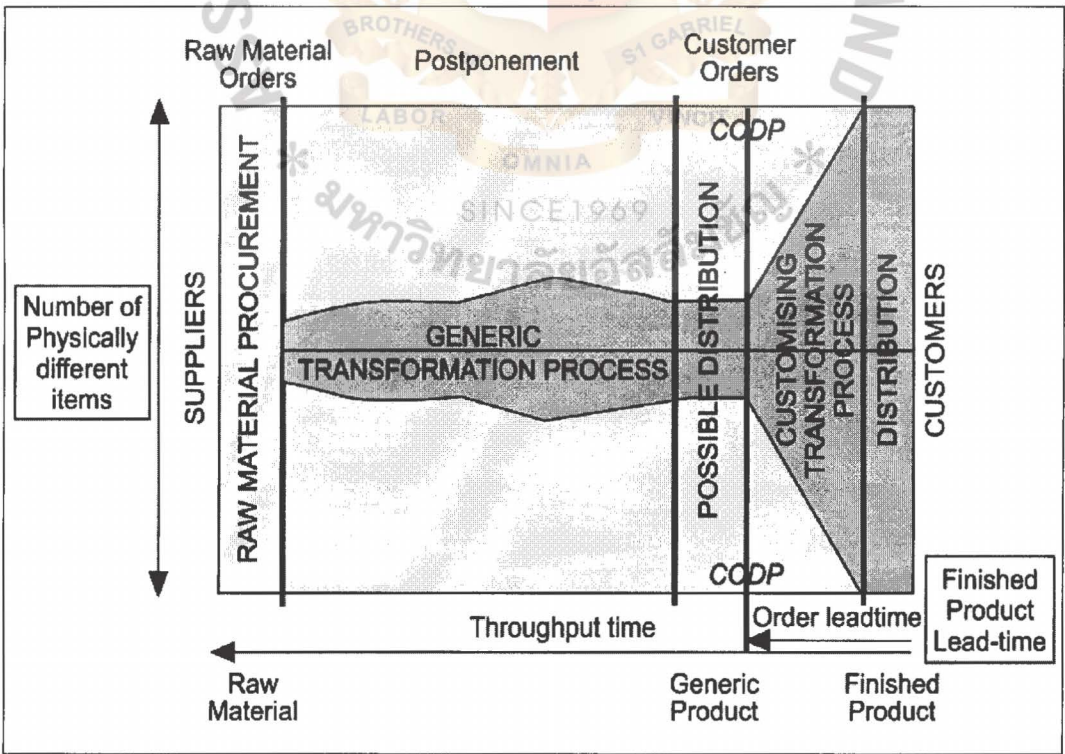
Source: Yang et al. (2007)

Many times, postponed activities may not happen within an organization within unified ownership. The successful postponement strategy increasingly relies on a supply chain wide thinking. For example, production postponement and purchasing postponement should be exploited to reduce inventory levels throughout the supply

chain rather than simply shift inventory burden to the lower tiers of the chain. Thus, in postponement applications, downstream players have to be concerned about possible order fulfillment problems with upstream in their supply chain. Otherwise, downstream players order as late as possible to avoid the lack of flexibility associated with giving the order at the beginning stage.

Another concept of postponement is called form postponement (Bowersox & Closs, 1996). Postponement is about limiting the amount of finished goods in stock and reducing inventory carrying and holding cost. Under this strategy, manufacturers may design and develop standard and perform individual customization quickly and inexpensively once actual demand is known (Yang et al., 2005). This strategy found that a greater source of saving is reducing transport costs, delaying the increase in the product's volume or holding inventory at the lowest value (Yang et al., 2005) as figure 2.4

Figure 2.4 Schematic Location of the CODP for the Form Postponement



Source: Yang et al. (2005)

The driving force of form postponement is to increase the knowledge of the contents of customer order at the production time (Olhager, 2003) by delaying customization. Under a form postponement strategy, operating with no inventory requires the development of the just-in-time system to enable manufacturers to benefit from maintaining their inventories. Postponement also emphasizes the role of being quick and reliable. Manufacturers may achieve a benefit from using faster transport to postpone production in time (Morash & Clinton, 1997).

2.3 Purchasing postponement strategy

In the purchasing postponement strategy, raw materials or components must be replenished quickly and arrive where and when they are needed. Manufacturers need to realize the potential benefit and importance of strategic and cooperative relationship between the buyer and the supplier. Purchasing postponement emerges as manufacturers experiment with strategic partnerships with their immediate suppliers. Some manufacturers take advantage of the immediate supplier's capability and technology during the product design stage through early supplier involvement (Yang et al. 2007).

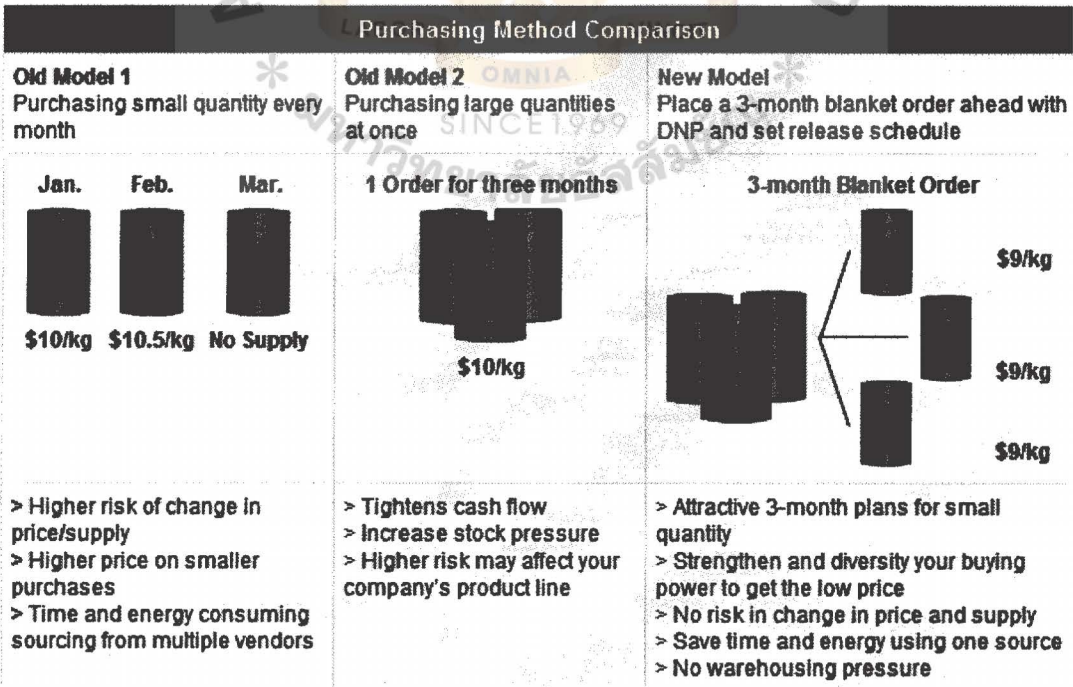
In the automotive industry, Sako et al. (1994) observed that purchasing postponement has resulted in a shift in inventories from the assembly plant to the supplier in a number of cases. This also underscores the need for a complete re-shaping of supply networks. By contrast, the supply contract restrictions on allowable changes to the timing and size of component orders allow those suppliers to stabilize their manufacturing environments by improving the accuracy of the production and shipping information. Such an environment allows these suppliers to better time the manufacture of their components with the buyers need for them, thereby reducing the need for finished goods inventories and reducing inventory costs (Krajewski, Wei, & Tang, 2005). The tighter restrictions on changes to order quantities improves production schedules, and consequently leads to less safety stocks often moving the decoupling point between process inventories and buyer demands closer to the raw materials level.

2.4 Purchasing postponement tools

In order to apply purchasing postponement to the company, the researcher found tools for the purchaser to re-design the working process which is indicated below.

2.4.1 Blanket order is defined as an order the customer makes with its supplier which contains multiple delivery dates scheduled over a period of time. The term agreement is specified in price levels, but without commitment to buy a specific quantity (International Trade Centre, 2000). This concept is to make a contract with supplier which contains multiple delivery dates scheduled for a period of time; for example; the company sends blanket orders to suppliers with one volume and fixed the price but they do not confirm the delivery date and delivery quantity yet. It will be informed to supplier one day in advance. So, suppliers have to prepare the raw materials and wait for the company’s call-off (Pull in strategy). Figure 2.5 shows a model by using blanket order which is familiar in automobile industry now.

Figure 2.5 Purchasing Method Comparison



Source: DNP International (2010)

This figure was compared to the purchasing method with three models starting from normal purchasing or spot purchase which buys the goods without any forecast. Second model is purchasing the large quantities per time that make company reduce the price per shipment. The last model used blanket order and made a contract with supplier. This model helps the company to control the price and does not need to hold an inventory.

2.4.2 Rolling forecast has been around for a long time. It was not have always been known by this name; nevertheless for over 50 years organizations have regularly looked ahead over a constant period of time with what today would be called a rolling forecast. Despite its long history the rolling forecast has been the subject of a recent surge of interest (Clarke, 2007). The purchaser created a three month material rolling forecast to all suppliers in order to inform about the trend of raw material in the next period. This information is necessary for supplier and reduces risk from material shortage with a purchaser.

2.5 Summary

In this study, the researcher focuses on inventory reducing by using postponement strategy in order to adapt with the company. Many researchers presented papers and case studies. Most of them have given the solutions and methodologies together with the results after a proposed consolidation model in their specific case and situation. The researcher adopted purchasing postponement strategy and re-design new process flow for the company.

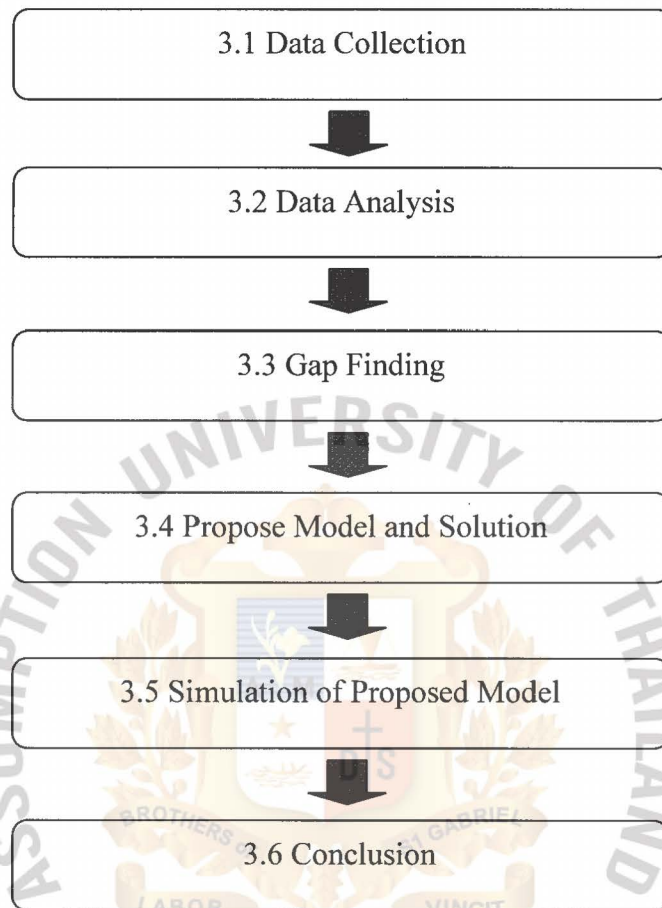
This study used one strategy to improve purchasing efficiency. However, the importance is that the focusing on how to reduce inventory cost and what the company would gain from applying this purchasing postponement strategy in order to obtain maximum benefits for the company.

CHAPTER III

RESEARCH METHODOLOGY

In this chapter comprise six sections. The first section presents data collection method of this research. It consists of in-depth interviews and documentation reviews to gather the company information such as inventory amount on January – June 2011, usage amount on January – June 2011, purchasing process and supplier information data. The second section describes data analysis to classify inventory type. The focus is on highest inventory which is material by comparing material inventory amount with usage amount. To fit with inventory day by mapping supplier location and lead time of purchasing was collected by the purchaser. The third section discusses the specific problem in gap finding to explain the current purchase strategy that effects, inventory control. The forth section demonstrates a proposed model for this research to find out the suitable method of purchasing in order to control inventory amount. Compare current situation by related theory. The proposed models were supported by literature reviews and concepts with the various researchers implemented in similar cases. The fifth section presents simulation of proposed models. The simulation will be analyzed by using data. The sixth section is a conclusion will be explained in the last topic. The stages of research conduction based on research design can be graphically illustrated in Figure 3.1 and is as follows:

Figure 3.1 Research Algorithm



3.1 Data Collection

The question is “How to reduce inventory?” are gathered via both qualitative and quantitative methods. This study focuses on the logistics process and inventory of raw material that are supplied from supplier to Thai Felt Company. The data is obtained from historical data of Thai Felt Company which includes:

1. Summary month end inventory 2011
2. Raw material month end inventory 2011
3. Raw material usage amount 2011
4. Summary raw material on June 2011
5. Purchasing lead time and Supplier location
6. Purchase order issue and Material received record

The data are collected through these following techniques:

3.1.1 In-depth interviews:

It is a technique to get information on the researcher's topic. During in-depth interviews with the purchaser and the warehouse staff, the researcher attempted to learn everything that participants can share such as order frequency, raw material area, purchasing lead time, suppliers name, supplier location and related data. It helps to know the current purchasing process that is a routine job and find the inventory problem that occur in the purchasing department.

3.1.2 Document reviews:

Most important data was collected by the company such as summary month end inventory 2011, raw material month end inventory 2011, raw material usage amount 2011 and summary raw material on June 2011. Most of the documents are kept in a system and soft files like purchase order and material received records. This data were used to analyze inventory day, create purchasing method to fit with the company in order to reduce inventory cost of raw materials.

3.2 Data Analysis

Inventory at Thai Felt Company was classified into three types which are raw materials, finished goods (FG) and work in process (WIP) which are supplied by the purchasing section and production section. Both raw materials and finish goods were kept at the warehouse area for space limitation. To control inventory amount of raw material, the researcher need data from the purchasing department. The summary inventory was done on January – June 2011 as indicated in Table 3.1.

Table 3.1 Summary Month End Inventory 2011

Unit: Million Baht

| TYPE | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | AVERAGE | % |
|-----------------|---------|----------|-------|-------|------|------|---------|-------|
| Raw material | 2.39 | 2.97 | 2.92 | 4.66 | 4.61 | 3.46 | 3.50 | 55.5 |
| Finished goods | 3.49 | 3.00 | 3.06 | 2.83 | 2.26 | 2.08 | 2.79 | 44.2 |
| Work in process | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 |
| TOTAL | 5.92 | 5.98 | 5.99 | 7.50 | 6.89 | 5.55 | 6.30 | 100.0 |

Source: Thai Felt Co., Ltd.

Table 3.1 shows that an average six month inventory from January 2011 – June 2011 is 6.30 million baht. Classified inventory amounts are raw materials worth 3.50 million baht, finished goods are worth 2.79 million baht and work in process is worth 0.01 million baht. The highest inventory is raw material at 55.5%, next is finished goods at 44.2% and the lowest inventory is work in process at 0.01%.

The researcher focused on highest inventory amount which is the raw material. Data of all raw material items was collected on January 2011 – June 2011. The material code was identified by the company. This code was called in house between purchaser and suppliers. However, some material items were not used every month. The data is shown in Table 3.2.

Table 3.2 Raw Material Month End Inventory 2011

Unit: Million Baht

| CODE | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | AVERAGE |
|-------|---------|----------|-------|-------|------|------|---------|
| FA-08 | 0.79 | 0.03 | 0.21 | 1.40 | 1.62 | 1.06 | 0.85 |
| FN-01 | 0.83 | 1.60 | 1.53 | 1.66 | 1.53 | 1.53 | 1.44 |
| FA-07 | 0.09 | 0.06 | 0.01 | 0.08 | 0.11 | 0.20 | 0.09 |
| RC-01 | - | - | 0.10 | 0.05 | - | 0.16 | 0.05 |
| FU-01 | 0.24 | 0.04 | 0.09 | 0.39 | 0.17 | 0.15 | 0.18 |
| RK-06 | - | 0.08 | 0.08 | - | - | 0.09 | 0.04 |
| FA-03 | 0.25 | 0.23 | 0.13 | 0.10 | 0.10 | 0.06 | 0.14 |
| FX-02 | 0.09 | 0.19 | 0.18 | 0.09 | 0.05 | 0.05 | 0.1 |
| FF-01 | 0.03 | 0.12 | 0.10 | 0.16 | 0.18 | 0.05 | 0.1 |
| RG-01 | - | 0.03 | 0.03 | 0.03 | 0.02 | 0.06 | 0.03 |
| RG-02 | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.02 |
| FS-03 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 | 0.01 | 0.02 |
| FT-01 | - | 0.01 | 0.01 | 0.01 | - | 0.01 | 0.01 |
| RT-01 | 0.02 | 0.05 | 0.03 | 0.01 | - | 0.01 | 0.02 |
| FS-02 | - | - | - | - | - | 0.01 | 0.01 |
| FJ-01 | 0.01 | 0.22 | - | 0.24 | 0.40 | - | 0.14 |
| RN-01 | - | 0.20 | 0.31 | 0.21 | 0.32 | - | 0.17 |
| RR-01 | - | 0.06 | 0.08 | 0.19 | 0.06 | - | 0.07 |
| FS-01 | 0.01 | 0.01 | - | 0.01 | - | - | 0.01 |
| RG-04 | 0.01 | 0.01 | - | - | - | - | 0.01 |
| TOTAL | 2.39 | 2.97 | 2.93 | 4.66 | 4.61 | 3.46 | 3.50 |

Source: Thai Felt Co., Ltd.

Table 3.2 indicated that total of twenty raw material items was gathered from the company. It shows raw material inventory amount started from January 2011 – June 2011. The researcher focused on the end of the month of June 2011 as the base line for this study in order to analyze the root cause of highest inventories. The new strategy is proposed to the company by using this data by comparing it to the results of inventory amount after proposing the new scenario.

Table 3.3 Raw Material Usage Amount 2011

Unit: Million baht

| CODE | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | AVERAGE |
|-------|---------|----------|-------|-------|------|------|---------|
| FA-08 | 1.23 | 0.75 | 0.83 | 0.18 | 0.74 | 1.26 | 0.83 |
| FN-01 | 1.34 | - | 0.83 | 0.64 | 0.89 | - | 0.62 |
| FA-07 | 0.11 | 0.17 | 0.23 | - | - | - | 0.09 |
| RC-01 | 0.31 | - | - | 0.27 | 0.05 | 0.49 | 0.19 |
| FU-01 | 0.72 | 0.95 | 0.94 | 0.48 | 0.49 | 0.29 | 0.65 |
| RK-06 | 0.33 | 0.17 | 0.26 | 0.09 | 0.35 | 0.27 | 0.25 |
| FA-03 | 0.13 | 0.11 | 0.16 | 0.08 | 0.06 | 0.14 | 0.11 |
| FX-02 | 0.09 | - | 0.02 | 0.08 | 0.04 | 0.11 | 0.06 |
| FF-01 | 0.46 | 0.42 | 0.52 | 0.21 | 0.13 | 0.37 | 0.35 |
| RG-01 | 0.11 | 0.07 | 0.08 | 0.03 | 0.07 | 0.14 | 0.08 |
| RG-02 | 0.09 | 0.04 | 0.05 | 0.04 | 0.04 | 0.10 | 0.06 |
| FS-03 | 0.03 | 0.04 | 0.01 | - | - | 0.04 | 0.02 |
| FT-01 | 0.03 | 0.02 | 0.01 | - | 0.03 | 0.02 | 0.02 |
| RT-01 | 0.03 | 0.04 | 0.02 | 0.03 | 0.01 | 0.04 | 0.03 |
| FS-02 | 0.01 | - | - | 0.02 | - | 0.02 | 0.01 |
| FJ-01 | 0.70 | 0.45 | 0.69 | 0.24 | 0.09 | 1.16 | 0.56 |
| RN-01 | 0.70 | 0.40 | 0.51 | 0.32 | 0.33 | 1.00 | 0.54 |
| RR-01 | 0.16 | 0.27 | 0.30 | 0.06 | 0.29 | 0.06 | 0.19 |
| FS-01 | 0.05 | 0.05 | 0.07 | 0.03 | - | 0.01 | 0.04 |
| RG-04 | - | - | 0.01 | - | - | - | 0.00 |
| TOTAL | 6.63 | 3.95 | 5.54 | 2.80 | 3.61 | 5.52 | 4.68 |

Source: Thai Felt Co., Ltd.

Table 3.3 indicated the data of usage amount on January 2011 – June 2011. The researcher compared data to analyze inventory amount of June 2011 in order to get inventory day ratio as represented by the formula below.

$$\text{Number of Inventory Day} = \frac{\text{End Inventory Amount (June)} \times 30}{\text{Average Usage Amount}}$$

This formula is used to know the inventory day in each material item at the company. The data result show the inventory day that the company could support production unit without shortage problems. Then, the researcher compared inventory day with actual purchase lead time and supplier location as indicated in Table 3.4

Table 3.4 Raw Material on June 2011

| PART CODE | INVENTORY AMOUNT (Million Baht) | USAGE AMOUNT (Million Baht) | NUMBER OF INVENTORY DAY | PURCHASE LEADTIME (DAY) | SUPPLIER LOCATION |
|-----------|------------------------------------|--------------------------------|-------------------------|----------------------------|-------------------|
| FA-08 | 1.06 | 1.26 | 38 | 60 | RATCHABURI |
| FN-01 | 1.53 | - | 74 | 60 | JAPAN |
| FA-07 | 0.20 | - | 73 | 1 | RATCHABURI |
| RC-01 | 0.16 | 0.49 | 26 | 1 | CHONBURI |
| FU-01 | 0.15 | 0.29 | 7 | 1 | SAMUT PRAKARN |
| RK-06 | 0.09 | 0.27 | 11 | 1 | BANGKOK |
| FA-03 | 0.06 | 0.14 | 16 | 1 | RATCHABURI |
| FX-02 | 0.05 | 0.11 | 29 | 1 | CHONBURI |
| FF-01 | 0.05 | 0.37 | 5 | 1 | RATCHABURI |
| RG-01 | 0.06 | 0.14 | 17 | 1 | LOBBURI |
| RG-02 | 0.01 | 0.10 | 5 | 1 | LOBBURI |
| FS-03 | 0.01 | 0.04 | 12 | 1 | CHONBURI |
| FT-01 | 0.01 | 0.02 | 11 | 1 | CHACHOENGSAO |
| RT-01 | 0.01 | 0.04 | 7 | 1 | BANGKOK |
| FS-02 | 0.01 | 0.02 | 19 | 1 | CHONBURI |
| FJ-01 | - | 1.16 | 0 | 1 | CHONBURI |
| RN-01 | - | 1.00 | 0 | 1 | CHONBURI |
| RR-01 | - | 0.06 | 0 | 1 | BANGKOK |
| FS-01 | - | 0.01 | 0 | 1 | CHONBURI |
| RG-04 | - | - | 0 | 1 | LOBBURI |

Source: Thai Felt Co., Ltd.

Table 3.4 show data of inventory amount on June 2011 compared with usage amount to get inventory day ratio. This data will be used to define purchase strategy to deal with the supplier. It showed that many items have inventory day ratio more than lead time requirement. For example; FA-07 can be used for 73 days while purchase lead time is only a day and the supplier was in Ratchaburi. FX-02 can be used for 29 days and purchase lead time is also one day. Moreover, this supplier is located in Chonburi.

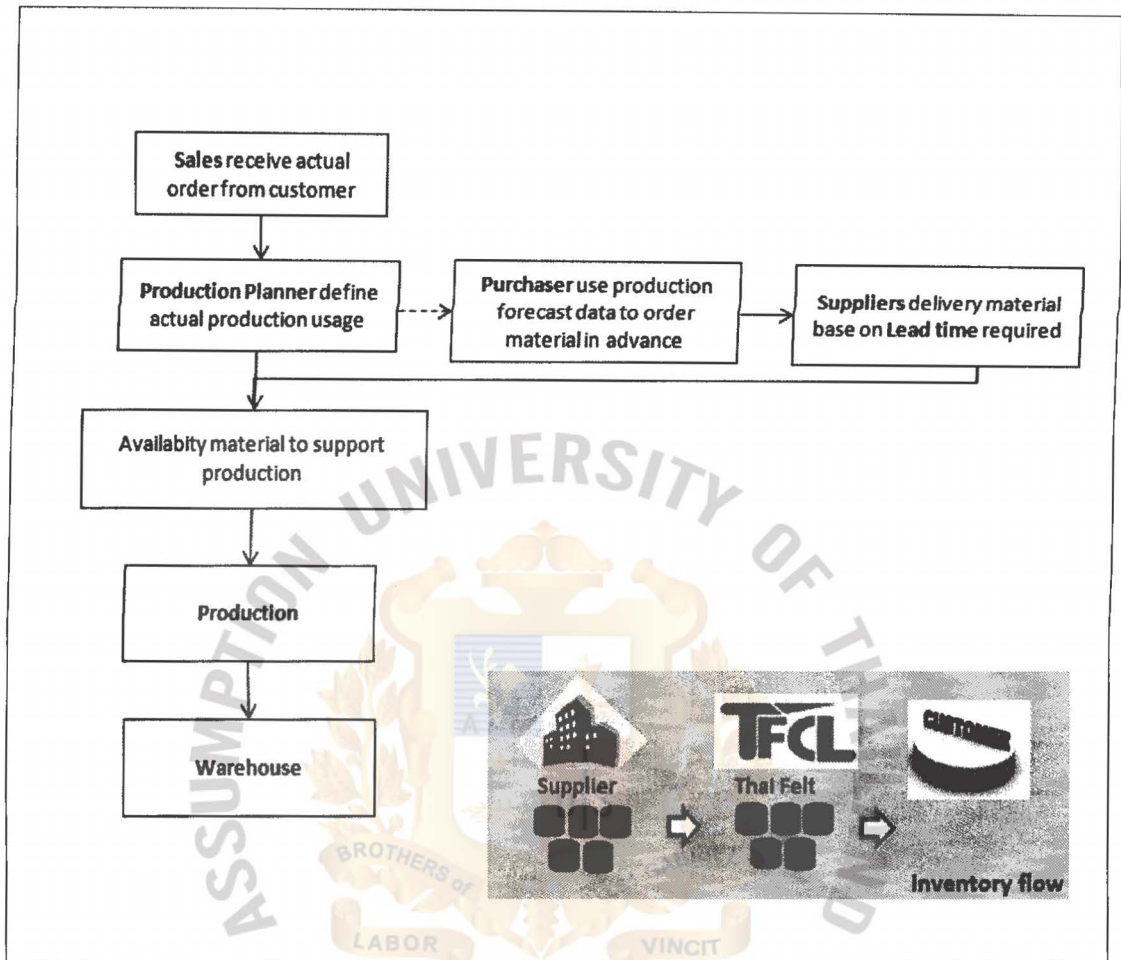
This data shows that only two material items FA-08 and FN-01 need two months purchase lead time. The rest of the material items could be supplied to the company within one day. So, this data shows that purchase strategy of Thai Felt should be reviewed in order to increase efficiency and minimize inventory levels.

3.3 Gap Finding

From in-depth interviews with the purchaser, the purchasing method was confirmed to order material by production forecast data and deduct it with the inventory amount of each month. Then the purchaser would issue the purchase order to the supplier and control the delivery base on lead time requirement. The purchaser lacks contact with the internal colleagues such as production planner, material controller or production manager. This is necessary because they need to know how much of raw material to produce in few periods. It is found that the purchaser would like to keep more inventories to avoid material shortage problem.

At this point, it is noticed that a purchaser, purchase raw material by imagination, own experience and lack of knowledge. The purchasing method of the company can be understood by the illustration in Figure 3.2.

Figure 3.2 The Purchasing Method of Thai Felt Co., Ltd.



This figure starts from the actual order of the sales department which informed the planning department. The flow shows that the purchaser did not use this information to recheck the raw material that they purchased. The purchaser still used production forecast to order the material in advance. When the purchaser issued purchase order to suppliers, they just waited for the delivery date to purchase the order as required. This process assured that the available material could support the production unit without any problems until the finished goods was kept in the warehouse and delivered to the customer. According to the current purchasing process, the researcher found that actual delivery of raw material is unsuitable with the delivery plan. It assumes that the purchaser did not check the delivery schedule. Table 3.5 shows the material received record at warehouse compared with the purchase order in the same period by percentage.

Table 3.5 Compare P/O issue & Received Record on January - June 2011

| PART CODE | AVERAGE P/O ISSUE (KG) | AVERAGE RECEIVED RECORD (KG) | % (RECEIVED DATA – PO ISSUE) |
|----------------------|-----------------------------------|---|---|
| FA-08 | 8,426.67 | 9,437.17 | 11.99 |
| FN-01 | 2,640.00 | 2,200.00 | -16.67 |
| FA-07 | 6,939.17 | 7,643.67 | 10.15 |
| RC-01 | 1,500.00 | 2,500.00 | 66.67 |
| FU-01 | 8,133.33 | 9,800.83 | 20.50 |
| RK-06 | 2,833.33 | 2,833.33 | - |
| FA-03 | 8,687.67 | 8,398.17 | -3.33 |
| FX-02 | 2,000.00 | 2,028.83 | 1.44 |
| FF-01 | 16,000.00 | 14,580.33 | -8.87 |
| RG-01 | 18,000.00 | 17,333.33 | -3.70 |
| RG-02 | 6,313.33 | 5,280.00 | -16.37 |
| FS-03 | 35,500.00 | 39,500.00 | 11.27 |
| FT-01 | 1,133.33 | 1,183.33 | 4.41 |
| RT-01 | 236.67 | 230.83 | -2.46 |
| FS-02 | 675.00 | 916.67 | 35.80 |
| FJ-01 | 8,666.67 | 7,666.67 | -11.54 |
| RN-01 | 6,666.67 | 3,833.33 | -42.50 |
| RR-01 | 3,110.00 | 3,110.00 | - |
| FS-01 | 191.67 | 316.67 | 65.22 |
| RG-04 | - | - | - |

Table 3.5 compared received record quantity with purchase order issued quantity. It shows raw material items had received record more than PO issued. This is ineffective because the purchaser works as the routine job. The data results effect inventory control and assure that purchaser had delivery control problems. This paper will propose the scenario that would help the company to reduce inventory amounts by using purchasing postponement strategy. So that it's efficiency is improved.

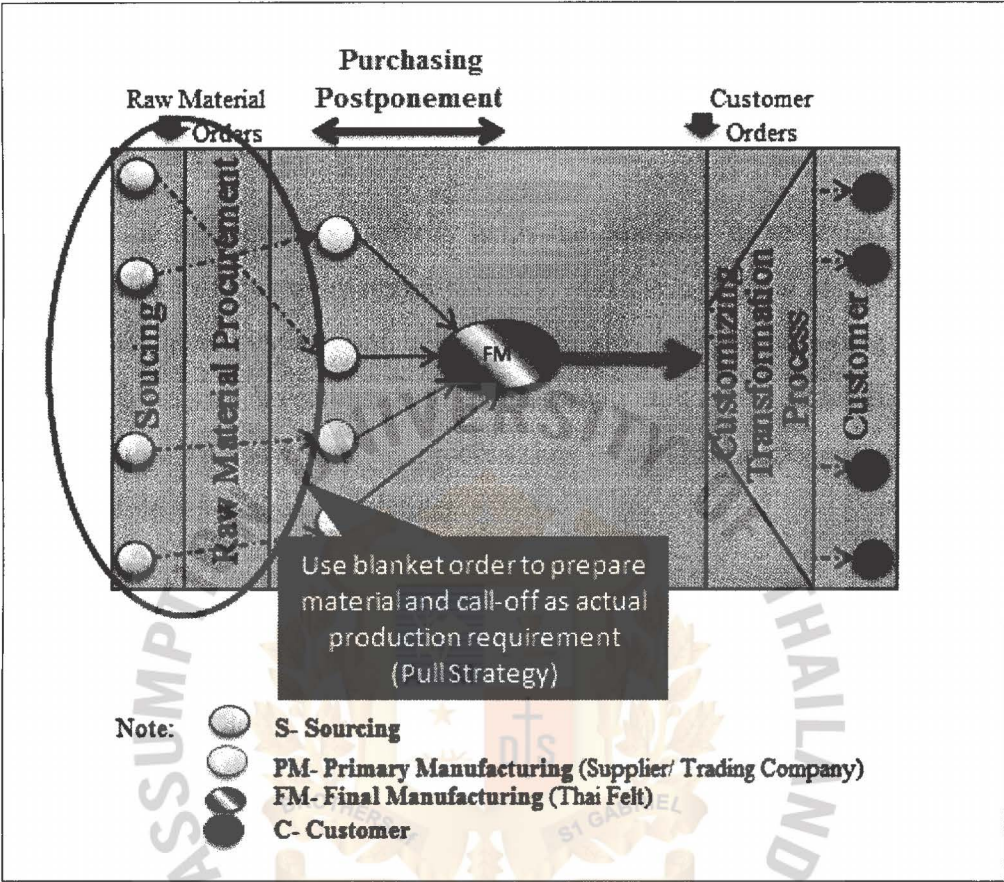
3.4 Propose Models and Solutions

From the data analysis, the main problem is the purchasing method which is unsuitable with the company. The researcher found that the purchaser lacked knowledge and strategy to control raw material inventory. The purchaser purchased materials to support production unit and ignored the inventory level. This inventory effects the amount in each month. In order to solve this problem, the researcher intended to study solutions and methodologies to re-design purchasing method of the company and minimize inventory level.

The researcher proposed purchasing postponement strategy by using Blanket order to all suppliers which is a flexible or open delivery date to call-off as actual production requirement (Pull Strategy). The scenario would give forecast to suppliers in order to prepare raw material for the company. This material forecast was guaranteed to purchase materials for the company, three months in advance. The purchaser used this information to issue purchase order once a month. Then, create a Part Delivery Sheet (PDS) which requested delivery date of a day in advance. PDS data based on actual production usage which supported by the production planner. This strategy is well-known in the automotive industry and customers also used it with the company.

The purchasing postponement will be the key factor to delay activities until purchase orders are received. It entails the implementation of inventory to deploy inventory away from the customer and reduce inventory cost (Bowersox et al., 1993); for example; HP DeskJet printers found that postponement strategy is the greater source of saving due to volume reduction. They cut transportation cost by delaying an increase in volume to increase flexibility such as holding inventory at its lowest value (Twede et al., 2000). The below purchasing scenario was proposed to use at the company so that the researcher could improve purchasing efficiency.

Figure 3.3 Purchasing postponement's Scenario



Source: Adopted from Yang et al. (2005)

Figure 3.4 shows the purchasing postponement period in order to do the delay activities or pull in delivery with suppliers. The researcher would propose purchasing postponement for the company. This activity would get confirmation by the supplier once the company made an agreement. The benefit of this strategy is as follows:

3.4.1 The supplier agrees to provide material items at the agreed price and timescales on or as needed over a period of time. There is no commitment to buy a certain amount.

3.4.2 Saves time and effort for the purchaser and allows end-users to call-off requirements directly.

3.4.3 The delivery frequently requires service when it is difficult to predict amount in advance. It helps company to save inventory costs as the product is made as soon as the order is received.

3.4.4 It helps to build in supplier performance measurements by controlling schedule as the company requires.

This purchasing postponement activity helps the company to re-design the purchase method. It helps to focus on material delivery with the right cost and at right time in order to reduce inventory amount. This scenario also helps the company to minimize and control inventory level based on actual production usage from the production planning section. The new working process flow of purchasing department will be re-designed and shown in the next chapter.

3.5 Benefits of Proposed Model

The proposed model is used for understanding the behavior or evaluating the system's strategy over a period of time (Khan, 1999). Excel spreadsheet has widely been used for strategic decision making in trade, finance, and other commercial areas, but recent developments of modern spreadsheets have provided an interactive modeling environment in which the user can apply power quantitative management tools to develop models for the purpose of system analysis.

The excel spread sheet shows number of inventory of the day and month end that can be reduced by using the postponement strategy. The postponement's scenario will be analyzed and shown in one Table as the AS-IS Model, TO-BE model and Saving Cost per items.

The benefits of this project is that inventory amount are expected to be lower. The objective of simulation model is to re-design the purchasing method of Thai Felt Company and convert it to the saving cost in each material item.

3.6 Summary

Raw material has the most inventory days and the highest inventory cost compared to other inventory types. Then, purchaser would like to avoid material shortage problem from uncertainty demand and risk so, they purchase raw material by using production forecast data. The researcher found that actual production usage data that the production planner received from sales department was useful for the company. It helped to know how much to purchase of raw material for each month. From the proposed scenario, the researcher used the Purchasing postponement strategy for the company in order to minimize inventory level by using delayed activities. Also, interviews were conducted with the purchaser to collect qualitative information of the actual practices and apply them to the new purchasing process flow. The current purchasing activity is defined as being passive without strategic approaches.

The critical analysis of this proposed scenario will be shown thoroughly in the next chapter. The outcomes from the analysis are expect to benefit the study of this project and bring sufficient information or data for the company in order to make a decision whether to adopt this scenario into the supply chain management.

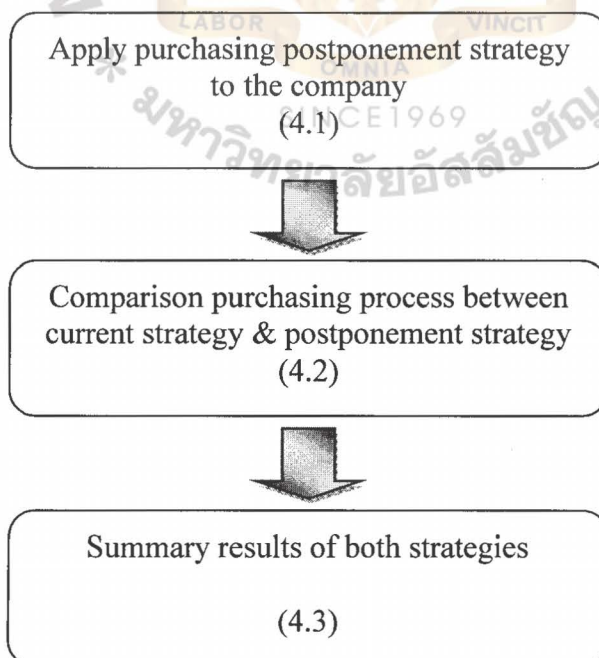
CHAPTER IV

PRESENTATION AND CRITICAL DISCUSSION OF RESULTS

This chapter comprises of three sections. The first section is concerned with applying the purchasing postponement strategy to the Thai Felt Co., Ltd. including re-design of the new purchasing process flow and focusing on new inventory amount. The second is the comparison purchasing process between current strategy and postponement strategy. This section has calculated cost saving and shows the result of inventory day and its cost. The last section summaries results of both strategies. It is a summary of critical analysis, calculations, and cost saving results from the proposed scenario.

The application of postponement that was described in chapter 3 in order to reduce raw material inventory are shown. The presentation and critical discussion of the results are shown in Figure 4.1.

Figure 4.1 The Presentation and Critical Discussion of Results Structure



4.1 Applying Purchasing Postponement Strategy

The researcher applied the purchasing postponement to re-design the purchasing method and get new working process flow of the company. Chapter 3, identified that the problem has been addressed to the company was that of efficiency of purchasing. The purchaser would like to avoid material shortage problem from uncertainty demand and risk by keeping raw material available.

The new purchasing method is to give the blanket order and three months rolling forecast to all suppliers in order to prepare its finished goods get raw material at their side in order to participate in actual demand and call-off delivery base on actual production usage. The purchaser use forecast information to issue blanket order instead of normal purchase order. The last process is created by the Part Delivery Sheet (PDS) base on actual production usage which request for the delivery date a day in advance. The supplier prepares their own materials base on rolling forecast then, use blanket order information to produce finished goods of the company and keep it in their warehouse. When the purchaser sends the PDS data to the supplier, it takes a day delivery lead time in order to deliver raw material to Thai Felt Company.

Figure 4.2 The New Working Process Flow of Thai Felt Co., Ltd.

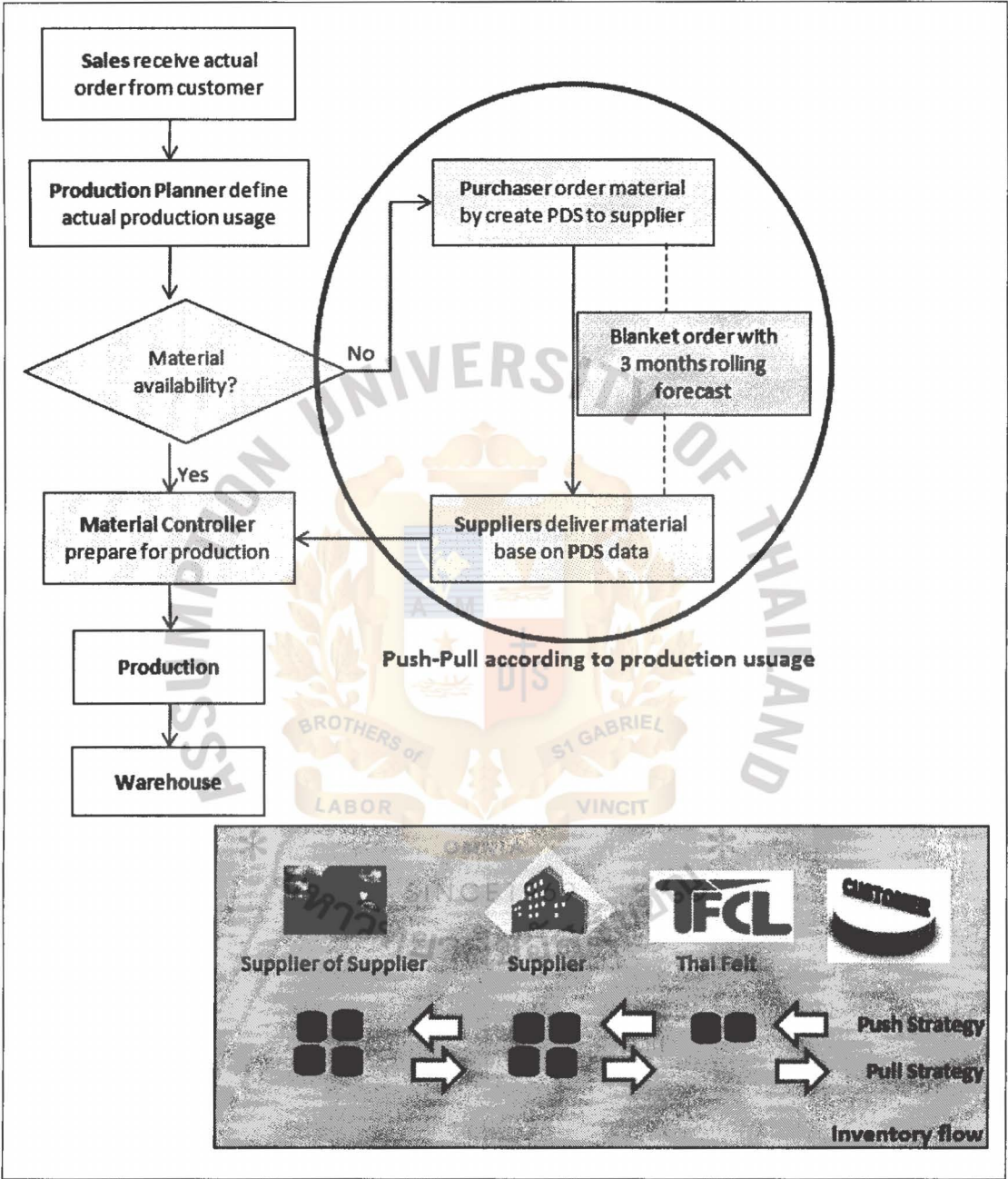
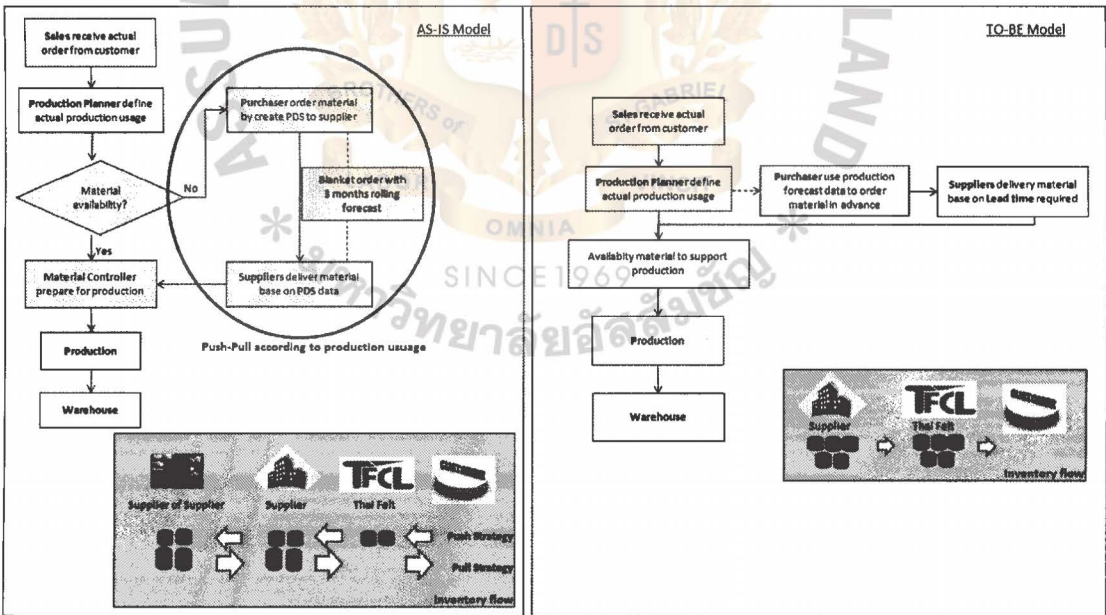


Figure 4.2 shows the new working process flow of the company which start from customer order that is sent to the sales department. The production planner used that data to calculate production usage in order to compare with the availability of raw material. Then the material controller prepared raw material for the production unit. The purchaser will get the acknowledgement when raw material falling so that the

order can be placed and the lead time based on actual production information can be identified. Most of material was kept for the company. The supplier needs one day lead time to prepare the material and deliver it to Thai Felt. When the supplier received the PDS from the purchaser, they will deliver the raw material in order to support the production unit until finished goods are kept in the warehouse and delivered to the customer. The researcher analyzed that the purchaser has more efficiency by using purchasing postponement strategy.

Inventory flow shows that the company can control raw material as they need. The Thai Felt Company can encourage their suppliers to use this methodology with tier 2 suppliers in order to minimize inventory level. In order to understand the difference between current working process flow and new working process flow, the researcher made a comparison data as shown in Figure below.

Figure 4.3 Comparison of Working Process Flow of Thai Felt Co., Ltd. Each Period



Because of the new working process flow used by the company, the purchaser could keep eighteen material inventory items for a day as supplier lead time. First two items (FA-08 and FN-01) are excluded in the comparison because their total purchase lead time is sixty days due to their operation complexity.

Table 4.1 shows the number of inventory day and summary of month end inventory amount after applying purchasing postponement.

Table 4.1 Inventory Day and its Cost through Purchasing Postponement

| PART CODE | AVERAGE NUMBER OF INVENTORY DAY (TO-BE) | SUMMARY MONTH END INVENTORY AMOUNT (TO-BE) (Million Baht) |
|-----------|---|---|
| FA-07 | 1 | 0.0027 |
| RC-01 | 1 | 0.0062 |
| FU-01 | 1 | 0.0214 |
| RK-06 | 1 | 0.0082 |
| FA-03 | 1 | 0.0038 |
| FX-02 | 1 | 0.0017 |
| FF-01 | 1 | 0.0100 |
| RG-01 | 1 | 0.0035 |
| RG-02 | 1 | 0.0020 |
| FS-03 | 1 | 0.0008 |
| FT-01 | 1 | 0.0009 |
| RT-01 | 1 | 0.0014 |
| FS-02 | 1 | 0.0005 |
| FJ-01 | 1 | 0 |
| RN-01 | 1 | 0 |
| RR-01 | 1 | 0 |
| FS-01 | 1 | 0 |
| RG-04 | 1 | 0 |
| TOTAL | 1 | 0.06 |

4.2 Comparison of Purchasing Process between Current Strategy & Postponement Strategy

The researcher used Microsoft Excel program to analyze data and compare the result among scenario as mentioned in chapter 3. The results show a number of inventory

day and month end inventory cost that was reduced by applying postponement strategy. Table 4.2 shows data as the AS-IS scenario that was analyzed by using company data and shows the result as in chapter 3. TO-BE scenario is used after applying purchasing postponement strategy by the company and the result were shown in the previous topic. By comparing the results of the month end inventory and the current strategy (AS-IS scenario) and postponement strategy (TO-BE scenario) the company can obtain saving cost per items.

Table 4.2 Comparison of Purchasing Process in Each Period

| PART CODE | AVERAGE NUMBER OF INVENTORY DAY AS-IS | AVERAGE NUMBER OF INVENTORY DAY TO-BE | SUMMARY MONTH END INVENTORY AS-IS (Million Baht) | SUMMARY MONTH END INVENTORY TO-BE (Million Baht) | SAVING COST (Million Baht) |
|----------------------|--|--|---|---|---|
| FA-07 | 73 | 1 | 0.2000 | 0.0027 | 0.1973 |
| RC-01 | 26 | 1 | 0.1600 | 0.0062 | 0.1538 |
| FU-01 | 7 | 1 | 0.1500 | 0.0214 | 0.1286 |
| RK-06 | 11 | 1 | 0.0900 | 0.0082 | 0.0818 |
| FA-03 | 16 | 1 | 0.0600 | 0.0038 | 0.0563 |
| FX-02 | 29 | 1 | 0.0500 | 0.0017 | 0.0483 |
| FF-01 | 5 | 1 | 0.0500 | 0.0100 | 0.0400 |
| RG-01 | 17 | 1 | 0.0600 | 0.0035 | 0.0565 |
| RG-02 | 5 | 1 | 0.0100 | 0.0020 | 0.0080 |
| FS-03 | 12 | 1 | 0.0100 | 0.0008 | 0.0092 |
| FT-01 | 11 | 1 | 0.0100 | 0.0009 | 0.0091 |
| RT-01 | 7 | 1 | 0.0100 | 0.0014 | 0.0086 |
| FS-02 | 19 | 1 | 0.0100 | 0.0005 | 0.0095 |
| FJ-01 | 0 | 1 | 0 | 0 | 0 |
| RN-01 | 0 | 1 | 0 | 0 | 0 |
| RR-01 | 0 | 1 | 0 | 0 | 0 |
| FS-01 | 0 | 1 | 0 | 0 | 0 |
| RG-04 | 0 | 1 | 0 | 0 | 0 |
| TOTAL | 13.2 | 1 | 0.87 | 0.06 | 0.81 |

| | | | | | |
|--------------|-------------|----------|-------------|-------------|-------------|
| RG-04 | 0 | 1 | 0 | 0 | 0 |
| TOTAL | 13.2 | 1 | 0.87 | 0.06 | 0.81 |

In the comparison table of inventory cost saving, the researcher assured that purchasing postponement strategy could help the company to minimize inventory levels and reduce the unnecessary inventory items. The purchaser could use the purchasing postponement tool to support their work in order to improve purchasing efficiency. From the overall analysis and the findings in this study, it shows that the company can save on inventory of amount 0.81 million baht in total or 92.75% per month. In addition, it can reduce inventory days from 13.2 days to be only one day. This purchasing postponement scenario helps the company to reduce inventory amount and also reduce the space of raw material in the warehouse area.

4.3 Summary

Raw material inventory amount of Thai Felt Co., Ltd. was reduced after applying the purchasing postponement scenario into their supply chain to improve purchasing method as well as create new effective process by using postponement strategy.

The inventory cost saving given in the simulation is consider extremely huge because it was as large as 92.75 percent (reduce from 0.87 million baht to 0.06 million baht) from January to June 2011 result. The scenario shows that the company was reduced inventory day from 13.2 days to be one day or 92.75 percent.

The purchasing postponement strategy helps the purchaser to expand the relationship with the supplier in order to communicate the information to them. The purchaser could focus on the necessary material usage and support the production unit whenever they require. The benefit to the company is saving cost and can developing the organization. The management can use this change to make continuous improvement with other teams or other departments of Thai Felt Co., Ltd.

CHAPTER V

SUMMARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter has five major sections. The first section is summary findings of purchasing postponement strategy from the detail analysis. The second section is the conclusions of the result data. The third section is theoretical implication that provides the concept of many postponement theories. The forth section is managerial implications that applies the postponement scenario into practice. The fifth section is the limitation and recommendations for future research in order to assist other researchers to study the purchasing postponement scenario extensively or develop current scenario.

5.1 Summary of the Findings

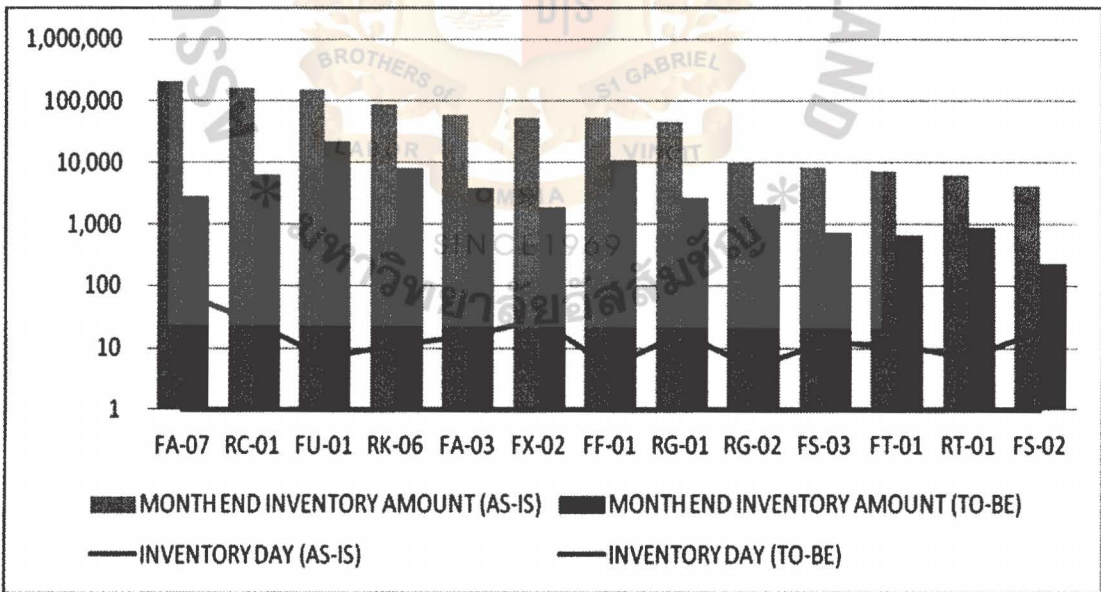
The objective of this paper is to minimize inventory levels by proposing a purchasing postponement strategy and reduce the inventory amount. Raw material inventory of the company is 55 percent of total inventory and the average inventory per month is 3.5 million baht. The problem occurs because the purchaser lacks of knowledge of push-pull delivery and is not aware of high-inventory level. As Thai Felt Co., Ltd. is a SME business, the company's product does not vary and has only 20 raw material items. Raw materials are purchased from Thai trading firm who imports directly from the manufacturing companies. Some materials were made in Thailand and the suppliers were located in Ratchaburi and Chonburi.

The researcher would like to improve efficiency of the purchaser and gain maximum benefits for the company by re-structuring the points of purchasing method. The purchaser could contact the material controller in order to check material availability. The order is that placed based on usage to the supplier by using only one day lead time. The purchaser give the forecast to all suppliers in order to prepare raw material

for the company. The available material could be delivered to the company within one day. The purchasing postponement provides opportunity to reduce risk and inventories while the company still provides product variety and continuously supports customer requirement. The benefits of postponement are reduce inventory, reduced complexity in the production process and increase responsiveness by shortening the final customizing cycle time (Hoek, 2001).

Finally, purchasing postponement strategy can prevent the company high inventory by holding unnecessary shipment at the supplier. Thus, the company can use the suitable strategy to reduce inventory levels and produce the goods to meet customer's demand, the main objective of reducing raw material inventory amounts. Figure 5.1 shows inventory cost of raw material decrease. It helps the company to adopt this scenario into their working process while the inventory days also decrease.

Figure 5.1 Comparison of Purchasing Process in Each Period



5.2 Conclusions

The result is applying purchasing postponement scenario by using data from January 2011 – June 2011. It shows that the inventory cost had a 0.06 million baht reduction from the current practice which was 0.87 million baht. The company obtained 0.81 million baht or saved 92.75 percent. At the same time, inventory day under this scenario is just one day compared with original inventory of 13.2 days. That means 92.75 percent reduction. Thus, the company would gain benefit if they proposed the purchasing postponement strategy as this scenario. The researcher identified the potential for significant cost saving over the current strategy based on this analysis.

The researcher presented that a purchasing postponement can reduce inventory day and cost. The more upstream point of view is purchasing postponement can be applied in the supply chain to reduce inventory holding cost and supply risk process. This scenario could be applied for the automotive manufacturers who are the suppliers for end-user companies.

5.3 Theoretical Implications

With a purchasing postponement strategy, little inventory exists to cushion production or scheduling problems. Raw material must be replenished quickly and delivery must be based on production usage requirement (Yang et al., 2007). Manufacturers need to realize the potential benefits and importance of strategic and cooperative relationship between buyers and suppliers.

The purchasing postponement strategy helps to reduce inventory levels and its cost. It also helps the purchaser to improve purchasing efficiency. Other researchers can use the concept of purchasing postponement to achieve cost saving in other industries especially automotive industries.

5.4 Managerial Implications

A company can choose its level of purchasing postponement, which is the choice work in process (WIP) or finished goods at which the company responds to a specific customer request. Meanwhile, the company needs to provide advanced warning to a supplier for a change to order size or timing. However, the warning may come within the effective lead time horizon, leaving the supplier to somehow cope with the change. This is reflective of not only the capabilities of the manufacturing process but also the nature of the supply contract (Krajewski et al., 2005). Flexible supply contracts and thus relatively frequent schedule revisions require a supplier to frequently deal with changes in production volumes and delivery schedules. It has been well documented in the postponement literature and may have significant consequences for supply chain performance.

5.5 Limitations and Recommendations for Future Research

This study, the purchasing postponement scenario has been applied to reduce raw material cost saving of the company only. For future research, researchers can also use the concept of purchasing postponement scenario to achieve cost saving in other industries especially automotive industries. However, the material cost in this study is based on price agreement at one period of time.

Finally, the basic problem of the company in the purchasing method is due to a purchasers lack of knowledge in material ordering. This is solve through applying purchasing postponement scenario to minimize the inventory level of raw material, reduce inventory day and its cost at the company in order to improve purchasing efficiency. Further research may explore more on the results from other strategies and models.

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APPENDIX A

Raw Material of Felt



Raw Material of Rubber

