BUSINESS PROCESS RE-ENGINEERING OF AN AUTO PART COMPANY

By
PANISA THIENDAM

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
Bangkok, Thailand

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I, _____Panisa Thiendam_____

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.

BUSINESS PROCESS RE-ENGINEERING OF AN AUTO PART-COMPANY

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I confirm that this thesis/project has been carried out under my supervision and it represents the original work of the candidate.

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(Asst. Prof. l r. Nucharee Supatn)

Date P 2012

ACKNOWLEDGEMENTS

This project could not be successfully completed without the kindness of my advisor Dr. Nucharee Supatn. She gave me good advice and guidance from the start to the end of implementation appropriate. She gave appreciate suggestion, checked and corrected the faults in this project. For all of the comments and good suggestion. I would like to give special thanks to all of staff of the Supply Chain Management Department, of Assumption University.

Finally, My graduation would not be achieved without best wish is from my parents, Mr.Nirundon and Mrs.Yupin Thiendam, who help me with everything and always gave me great love, willpower and financial support until this study completion. A last special thanks to my relations and friends for their help and encouragement.

Panisa Thiendam

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14 September 2012

ABSTRACT

Business Process Reengineering (BPR) concept is applied to redesign the transportation process of an auto parts, car company. The research was conducted as a case study using Business Process Reengineering (BPR) in order to return the transmission package from the Thai plants to the Indian supplier.

To redesign the return process of the package data including the images of the new packages, general information of returning operation, total amount of the products and packages from the Indian supplier, current total of logistic cost and labor cost, the storage area of the warehouse and total lead time of returnable process are required. Data were collected by documentary reviews, observation, and interviews.

The results of this project is aligned with the business process reengineering (BPR) idea and can be applied to process of implement is returnable module effectively. After following step by step involved in the business process reengineering (BPR) to understand and measure the existing process the total cost and the lead time of all option are compared. The minimum cost of returning packages back to India is option 3 which combines the loading operation between Somrong and Banpho plant.

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Date: 26th December 2012

CHAPTER I

GENERALITIES OF THE STUDY

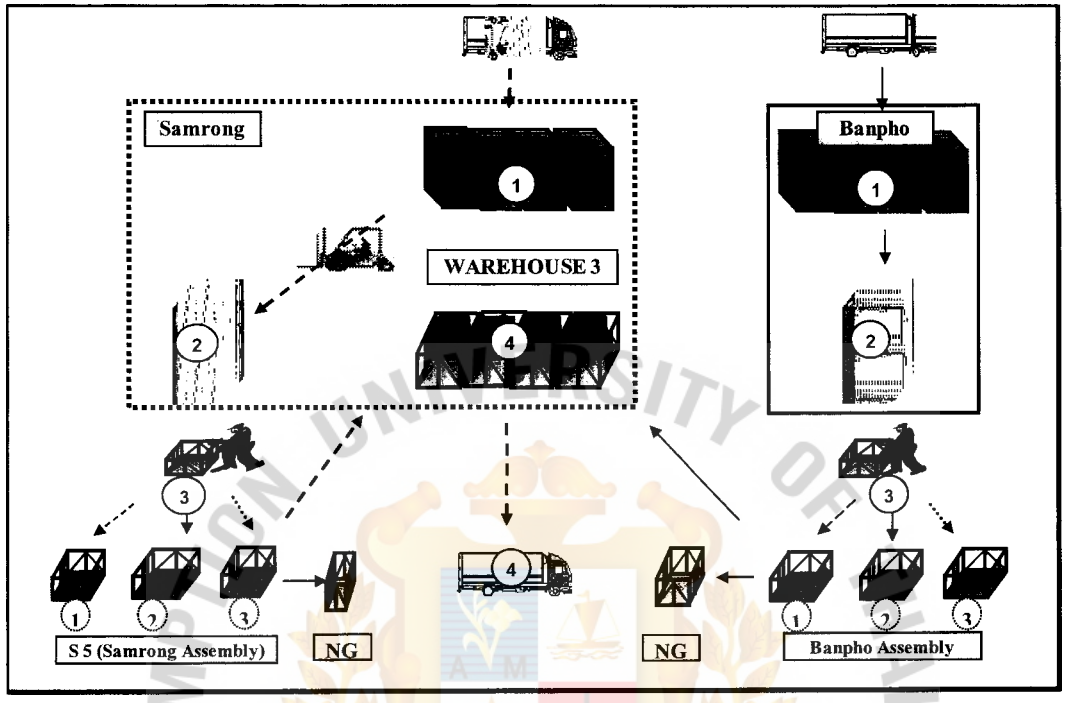
Supply chain management has becomes an important process for companies, especially for the manufacturing industry when it deliveries products at a competitive cost and at higher quality than the competitors. The importance of supply chain management is to produce and distribute products with the right quality to right location, and at the time, in order to minimize cost, satisfy customers and achieve service level requirements.

1.1 Background of the Study

TMT is a car manufacturing firm that was incorporated in Thailand in year 1962. TMT only sells cars domestically, but also export the component parts to many countries and importing parts from Japan and other countries for production to complete build up vehicles to both local and international markets. The most popular model for both markets is multi-purpose and pick up cars which are under the innovative multi-purpose vehicle model (IMV) of the Company.

One of the major imported parts for a complete build up innovative multi purpose vehicle model is the transmissions which are supplied by the plants in India. Previously, the transmission were packed in a steel module from India and some parts of the modules could be resold back to the Indian suppliers. However, in the actual operation, after unloading and unpacking the transmissions the packing staff have to select the good conditioned parts of the modules for re-selling back to the Indian supplier. The defective parts are kept at the storage area at the warehouse in Thailand, waiting for scrap operation. The flow is shown in Figure 1.1.

Figure 1.1: Previous Procedure of Unpacking Empty Package of Indian Supplier



Source: Author

Figures 1.1 explains the transmission process between Thai and Indian plants, step by step, the details are as follows:

Step 1: After unloading the products from the container, the transmissions are kept as stock at the warehouse in the Somrong and Banpho plants in order for production line to unpack the transmissions.

Step 2: The production line takes the packages from the warehouse to the unpacking area by the forklift.

Step 3: The workers unpack the 12 transmissions from 1 package. Then the packages are separated into four parts. The quality of each part of the packaging is verified. If any defects are found, that package part will be separated in order to be scraped

Step 4: Forklift loading packages are sent to the Stock area, for complete loading pattern [24 modules for 40-Feet container].The entire process is done separately between Samrong and Banpho plants.

1.2 Statement of Problem

All used packages are re-sold back to the India supplier. However, the usable life time of the packages is short. The maximum usage is not more than 3 times. Broken packages are found many times while they are transitions with the products to TMT. This makes the transmissions defected and the operation complicated. Moreover, the design of the package is difficult for the operator, because there are many folding step that workers have to do since while the lead time to complete the process is very long.

In order to eliminate all waste, Kaizen (continuous improvement) in the operation with more cost saving and the environmental preserving is planned. The company intends to implement the new project for returnable package (new package) from TMT to the Indian supplier. The new design of the steel packaging is not only done but the new packages are produced and ready for use. These is no need for the packing employees to separate the new packages into parts because it is designed to fold automatically after the transmissions (products) are removal. Hence, the lead time, manpower as well as the space required in the container would be excessively reduced. As such, the working process of unpacking and reselling the steel packaging back to India must be revised.

The concept of business process reengineering process (BPR) is one of the supply chain management strategies that can be used to design the new working process. The BPR is a responsive supply chain strategy founded on the rethinking and changing radical issues of the company to redesign business process to achieve the required performance (Hammer & Champy, 1993). Therefore, the problem, *"How would **BPR** strategy be implemented to reduce lead time and logistic cost of the returnable process of the transmission packages effectively"* is stated in this study.

1.3 Objectives of the Research

The main purpose is to understand and redesign the work process to be suitable with the returnable modules that will be done for the one-way packages that are currently used. Three specific objectives are proposed which are as follows:

- To identify the current problem about the returning of transmission steel packages from TMT plants to suppliers in India.
- To identify the options of redesigning the process of returning of transmission steel packages from TMT plants to the suppliers in India based on business process reengineering (BPR)
- To select the best procedures that provides appropriate logistics cost and lead time.

1.4 Scope of the project

The current operations of import parts from the Indian supplies are used for two plants in Somrong and Banpho. TMT haves separated the operations for return packages back to the Indians supplier for each plant. The new returnable package routing by reductions of the cycle time of retuning operation, and reduction of total cost by identifying the possible options and selecting the best options to redesign the new routes need to be implemented.

1.5 Significance of the Study

The project emphasizes on the cost reduction for logistic operations, elimination of waste from the defective packages by reduction of the cycle time of retuning operations. Moreover after implementing the project the new progress of returning packages must be easier to implement.

1.6 Definition of Terms

Business Process Reengineering	The quality management of rethinking and redesigning of business process to improve the critical measure of performance (Hammer & Champy, 1993).
Complete Build up Vehicle	When a car is imported or exported from some other country as a complete car fully assembled.
Innovative Multi Purpose Vehicles	Economy of scope to lower production cost as much as possible by producing the vehicles as innovative multipurpose vehicles such as Futuner, Hilux, SUV, and Innova.
Returnable Package	The packages that can be used more than two times for cost saving and environmental protection.

CHAPTER II

LITERATURE REVIEW

This chapter presents a literature review related to problems mentioned chapter one. The firstly review is the definition of business process reengineering (BPR) and the concept of business process reengineering (BPR) to understand that why business process reengineering (BPR) is useful for the Auto Parts Company. Then the elements of reengineering in an organization, investigation of business process reengineering (BPR) methodologies, and process development approaches are explained. Finally the cause and effect of business process reengineering (BPR) and the reason why Auto Parts Company should implement business process reengineering (BPR) to solve the existing problem are discussed in the following parts

2.1 Business Process Reengineering (BPR)

2.1.1 Definition of Business Reengineering (BPR)

This section discusses the concept, cause, and effect of Business Process Reengineering (BPR). BPR is the quality management that results from rethinking and redesigning of the business process to improve critical contemporary measure of performance, such as cost, quality, service and speed. Business Process Reengineering (BPR) does not require only the redesign of business process but the company must also provide the examination and redesign of the information technologies and organization that will improve and support the process. So Business Process Reengineering (BPR) rethinks the work (Hammer & Champy, 1993).The main existing problem of the Auto Parts Company is the design of the packages, so the company and the supplier made the decision to redesign the package and rethinks the business process to improve the critical contemporary measures of performance.

2.1.2 The Concept of Business Process Reengineering (BPR)

There are several models to implement Business Process Reengineering (BPR).The company should select the one that is appropriate for the company. The concept of Business Process Reengineering (BPR) is about the fundamental rethinking, radical change of the company based on the business process, dramatic improvement approach, and redesigning of the business process to achieve the performance (Hammer & Champy, 1993).

The key worlds of Business Process Reengineering (BPR) are fundamental, radical, dramatic and process. All these words have meaning in itself.

Fundamental means to change the basis for improving productivity and quality. Fundamental is the term of what? and how? ,such as "What represents performance?" that relates to the operations that the company wants to achieve as the business objective. And "How should work be redesigned?" These question require of Business Process Reengineering (BPR) into the overall strategy for maintaining a competition advantage (Sharma,2006). Fundamental is linked to the actual situation. It mean to change the previous design of package to improve the productivity and quality of the packages.

The world radical means an organization should throw away for the old way and devise a new way for the organization to create a better performance. In reality, there are many factors to be considered are crucial for the success of the Business Process Reengineering (BPR) attempt. For example, the management needs to ensure that the staff from different functions can work together, and pay attention to the promotion of stakeholder connection with effective planning while establishing Business Process Reengineering (BPR) (Hammer & Champy, 1993). Radical is linked to the management of Auto parts, Company. The Indian supplier made the decision to redesign the packages and rethink the new process by sharing the information and planning to implement the returnable packages.

Dramatic process in the Business Process Reengineering (BPR) is expected as a jumping result not as an improvement or increase result. There are three reasons that the company needs in order to reengineer. The first reason is the company's despairing situation, which needs dramatic improvement to survive. Secondly the management has foresight of serious problems in the near future. The third is the company has no trouble, but the management wants continuous improvement, to make it even more difficult for others to enter into the competition (Hammer, 1990). The management of Auto Parts Company had the foresight of serious problems in the near future. The defected packages of parts are in Thailand and the empty defective packages are in one container for return back to the Indian supplier

Process is compilation of activities that take one or more kinds of input and make an output that is of value to the customer. The organization works on the basis of mutual task interdependence. If the company could make a change in the process, the company could reduce the coordination cost. That means the company could provide better performance (Hammer, 1990). The process is linked to compiling of activities to make a change in the process, so the company could get better performance such as cost reduction of total cost for returnable packages.

2.1.3 Elements of Reengineering in an Organization

There are essential elements or principles of reengineering which are as follows (Abolo, 1997; Thomas, 1996)

- Rethinking the principles of the business.
- Challenging old supposition and break down old rules that are no longer applicable.
- Breaking away from assembly and the restrains of organizational boundaries.
- Think and execute as much activities as possible.
- To concentrating on flows and process through the organization.
- Using information technology, not automatic outdated processes but redesigning new ones.

- Internally focusing on harnessing more to the potential of people and applying it to those activities that identify and deliver values to customers.
- Supporting training and development by building a creative work environment.

2.1.4 Investigation of Business Process Reengineering Methodologies

The business process reengineering methodologies can be classified into two main categories according to approach the business process reengineering (BPR). First is a business process and information technology which exist to solve occurring problem (Valirs & Glykas, 1999). These researches consider a problem to be any expression of concern about the situation and regard a methodology as a structured set of the guidelines to solve the problem. They also identify new methodologies that view business process reengineering (BPR) in an organizational and concentrate on the understanding and analyzing the organization by using principles.

There are five steps to approach the business process reengineering (Davenport & Short, 1990).

1. Develop the business vision and process objectives

BPR is derived by a business vision which implies specific business objectives such as cost reduction, time reduction, output quality improvement, quality of work life.

2. Identify the processes to be redesigned

Most companies use the high impact approach which focuses on the most important process or those that conflict most the business vision. Few numbers of the companies use the thorough approach those attempts at identify all the processes within an organization and prioritizing them in order to redesign urgency.

3. Understand and measure the existing process

To avoid the repeation of old mistakes and for providing a baseline for future improvements.

4. Identity information technology (IT) levels.

Awareness of IT capabilities can and should influence the process.

5. Design and build a model of new process.

The actual design should not be viewed as the end of the BPR process. It should be viewed as a model, aligns the BPR approach with quick delivery of the results and the involvement and satisfaction of customers.

Some researchers of business process reengineering (BPR) have stated that business process reengineering (BPR) project cannot be planned literally in small explicit steps (Evans, 1993). However, the suggestion a broad framework for business process reengineering (BPR) project proposes four general stages;

Stage 1: To be: Define where to organization what to be and what it requires of business process as a consequence.

Stage 2: As is: Define current business processes.

Stage3: The plan: Make a plan to accomplish the move from the "as is" to the "to be" stage.

Stage4: The crossing: Implement the plan.

One weakness is that it tries to build a vision of the future process before understanding the current operations of the present process. The term "process" in business process reengineering means the difference between the logical activities of what the process does or should do the physical demonstration of how the process is performed (Murphy, 1996). There are structured approaches to devise the business process reengineering (BPR) methodology. The methodology is explicit as lists of phase with the basic question are summarized below (Fitzgerald & Murphy, 1996):

- Select the process to be reengineered: "Where are we going to start?"
- Establish process team: "Who is going to do it?"
- Understand the current process: "Where do our stakeholders see us now?" This phrase also establishes the current physical to logical mapping of the process.
- Develop a vision of the improve process: "Where do our stakeholders want us to be?" In this phase, the new logical model of the process is defined.
- Identify the actions need to move to the new process: "What do we need to achieve?" The new physical process model is established.
- Negotiate/execute a plan to accomplish these actions: "How will we achieve it?"

As with the development of any methodology that needs to test the new model also can be verify experimentally, validated, and modified appropriately. The recommend approach for business process reengineering (BPR) project includes the following (Prosci, 2003):

- Project planning: team selection, objective setting, scope definition methodology selection, schedule development, consultant selection, sponsor negotiation, change management planning, and team preparation.
- Current state assessment and learning from others: high-level process definition, benchmarking, customer focus groups, employee focus groups, and technology assessment.
- Solution design: process design, enabling technology architecture, organization design, and job design.
- Business case development: cost and benefit analysis, business case preparation, and presentation to key business leaders.
- Solution development detail process definition, system requirements writing and system development, training development, implementation planning, operational transition plan, and trials.
- Implementation: larger-scale pilots and phased implementation, and full implementation.

- Continuous improvement: ongoing improvement and measurement of new processes.

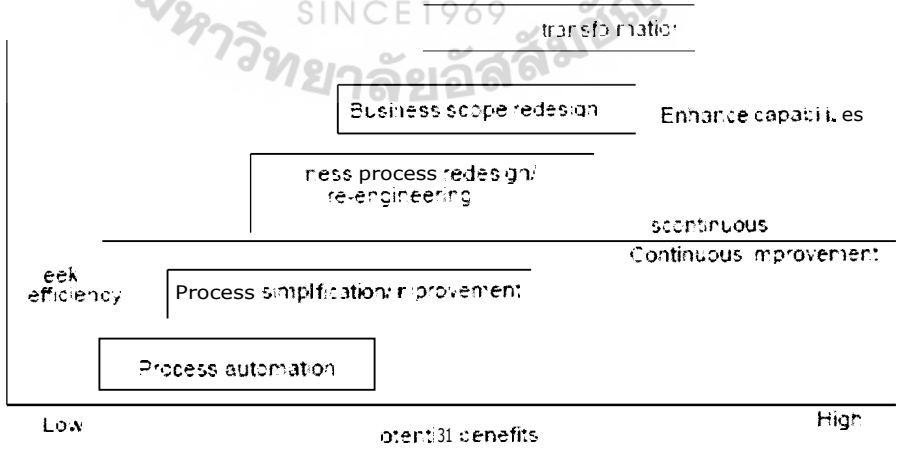
The startup activities to be of most importance as follow (Prosci, 2003):

- Secure executive management support and sponsorship.
- Communicate the need for change throughout the organization.
- Define the scope and boundaries of the project clearly.
- Establish measurable objectives for the project.
- Select team members with experience, skills, leadership, and full time availability.
- Train the team on business process reengineering techniques and tools.

2.1.5 Process Development Approaches

According to the concept of Hammer and Champy, the process automation can make the organization succeed, when it has the efficiency improvement.

Figure 2.1: Process Development Approaches



Source: Venkatraman (1995)

From the above picture, the process automation can be achieved efficiency improvement by adjusting the following steps;

First is, the step of process simplification/improvement; the organization should find out the significant areas for the improvement process. It can be the improvement of speed or quality by performing the core activities in a series, or arranging the gathered information to be more appropriate in each process. Process simplification/improvement also requires process analysis so that appropriate improvement can be specified and implemented.

Second step is business process redesign/re-engineering; organizations will normally have three or ten core business processes. Specifying processes needs analysis and research. The good processes should have order fulfillment, strategy development and product development. The scale of the re-engineering or redesign process will dependent on how many core business processes are included.

Third is is, the step of business scope redesign Business process redesign/re-engineering; this may create opportunities. By using the information technology, to improve the scope of the organization's business, the organization can build up a close relationship with suppliers or customers, American Airline's e-booking system, has redefined the scope of the airline's customer service through information technology.

And the last step is corporate transformation; the blending of process redesign and information technology of an organization, their suppliers and customers, may be described as corporate transformation. It implies a basic change in the nature of work. Supporting such basic changes needs a concept of human resources, training and development, management structure changes, and the definition of the organization's core business.

2.2 Cause and Effect of Business Process Reengineering (BPR)

There are three kinds of companies that undertake the reengineering (Hammer & Champy, 1993).

1. The company that find themselves in the trouble. They have no choice but to transform and improve the substructure of the process. They want to survive that company needs business process reengineering.
2. The company that is not in the trouble but the management foresees the problem in the near future. The problem it may become a larger burden.
3. The company that is best condition but the management sees the opportunity to improve a lead over their competitors.

There are some effects of business process reengineering (BPR) that have been mentioned in published journal. Many cases of business process reengineering case was failed on implementation. There are two major categories one is a lack of understanding of business process reengineering (BPR) and second is an incompetent to perform the business process reengineering.

The lack of understanding the business process reengineering (BPR) because the user misunderstand the business process reengineering (BPR). People confuse BPR with other programs such as total quality management (TQM) and some may confuse the functions of the process. Another is cause lack of understanding of BPR. Many person have very high expectations about the BPR result. The result after implementation does not achieves the goals. It is concluded that the BPR project failed. These unreliable expectations reduce the responsibility and belief of the management towards BPR.

Table 2.1: Process Improvement (TQM) versus Process Innovation (BPR)

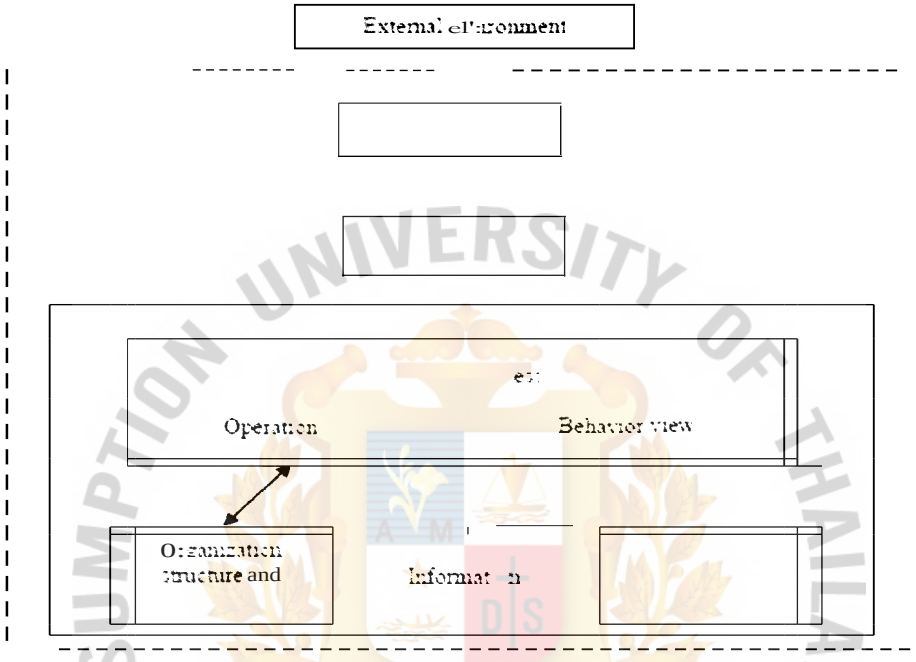
	Improvement	Innovation
Level of Change	Incremental	Radical
Starting Point	Existing Process	Clean Slate
Frequency of Change	One-time/ Continues	One-time
Time Require	Short	Long
Participation	Bottom-Up	Top-Down
Typical Scope	Narrow, within function	**Broad,** cross-unctional
Risk	Moderate	High
Typical Enabler	Statistical Control	Information Technology
Type of Change	Cultural	Cultural/ Structural
Underlying philosophy	Maintain harmony	Disrupt the status quo
Pace of change	Slow	Rapid

Source: Davenport (1993, p11)

The incompetence to perform BPR occurrs due to the lack of an effective methodology, wrong process and objective, and the lack of management commitment. The last reason is the most important since reengineering needs a new way of thinking to break out of the old way and to develop visions. Currently, there are many methodologies to used for BPR terms. Some management use the wrong process which did not add great value to the situation after reengineering. It means a wrong defined change objective would lead to reengineering failure. So the most importance things would be for the top management commitment and BPR is conducted as a top down process (Chan, 1997).

2.3 Framework of Business Process Reengineering (BPR)

Figure 2.2: Business Process Reengineering Implementation Framework



Source: Mansar & Reijers (2005)

Figure 2.2 shows the business process reengineering implementation framework, to understand the importance areas and sections in process redesign. These are given below:

1. Internal and external customers of the business process.
2. Products or services of the process.
3. Business process from two perspectives:

   Operation view: How has the business processes been implemented?

   (The number of tasks in an occupation, the relation level between tasks and activities, consistency rate, etc.)

   Behavior view: When has the business processes been implemented?

   (Tasks' sequence, composition, scheduling, etc.)

4. Participants in business process:
   Organization structure (element, roles, users, groups, units, etc.)
   Organization population (individuals, representatives that have the authority over tasks' execution and relation between tasks).
5. The information made or used by the business process.
6. The technology used by the processes, and finally the external environment which can be referred in Figure 2.2 this is an illustration of the BPR implementation

2.4 Summary

The conclusion for the related literature is reviewed in this chapter. The functions that are useful are Business Process Reengineering (BPR), to understand the definition and the concept of (BPR) are rethinking and redesigning of business process to improve in critical contemporary measure of performance. Implementation of BPR occurs by following the involved steps and process development approaches of Business Process Reengineering (BPR). Moreover to clarify cause and effect of Business Process Reengineering (BPR) the Auto parts Company has to undertake the BPR.

CHAPTER III

RESEARCH METHODOLOGY

This study focuses on the implement of the business process reengineering (BPR) to redesign the returnable process of the transmission packages from TMT plants in Somrong and Banpho. This chapter presents required data, possible processes and expected outcomes of the new returnable process designed based on the business process reengineering (BPR) concept. The methodology of data collection and analyses are discussed in this chapter.

3.1 Required Data and Data Collection

The required data includes the images of the new transmission packages, general information of returning operation, total amount of the products and packages from the Indian supplier, current total of logistic cost and labor cost for TMT, the storage area at the TMT warehouse for stocking the returnable packages and total lead time of the returnable process. The required data can be gathered from three methods i.e. documentary reviews, observation, and interviews. The details are as follows:

3.1.1 Documentary Reviews

The necessary documentaries are as follow:

a. Total product from the Indian supplier by usage reports of production control of each plants. The data collection for total product needs to be collected from January until June 2012 since the data is the most updated and the total product of six months did not fluctuate from last year. The data collected by import and export functions.

b. Total used transmission packages calculation. This data is calculated from the total product from the Indian supplier. The twelve transmissions are contained in one package. The total used transmission data is needed to estimate the total return for each month to how much that TMT can return packages back to the Indian supplier. The data collected by import and export function.

c. Total cost including logistic cost and labor cost. The cost of TMT is logistic and labor cost. The total cost need to collect the data for logistic operation and cost of operation for transmission packages. The data collected by import and export functions.

d. The storage area at TMT warehouse for keeping the empty returnable packages is calculated by the area as a part of the logistic function. It is concerned with how much area can be used for returnable package of the Indian supplier.

e. Total lead time of returning transmission packages back to the Indian supplier. This data is records the maximum lead time of each process for calculating the total cycle time of returning to each plant, and which operation wastes time. The data collected by import and export functions is also collected.

3.1.2 Interviews

The purpose of an interview is to share the information and collect the data with the Somrong and Banpho plants. The interview occurred three times by teleconferencing and face to face meeting. This is decided below.

In the first interview, teleconferencing between Somrong and Banpho plants was done to request and collect the total production from the Indian supplier by reporting production of both plants. Because this data needs to estimate the total usage of each month and the number of packages the Indian supplier will return back.

In the second interview both plants of TMT had face to face meeting at Somrong to confirm the lead time of each process that is concerned with both plant such as the unpacking process, and the loading process. The previous process may have been revised. TMT needs to collect the total lead time to update and calculate the total lead time of returning packages back to the Indian supplier.

In the third interview a teleconference was conducted about imports and exports interview of Somrong and Banpho plants in order to confirm and discuss the storage area that can be used at each warehouse. The new designs of returnable packages are easier to operate, so man power of the previous design needs two manpower process to fold the package, but the new design need only one manpower process to fold the package.

3.1.3 Observation

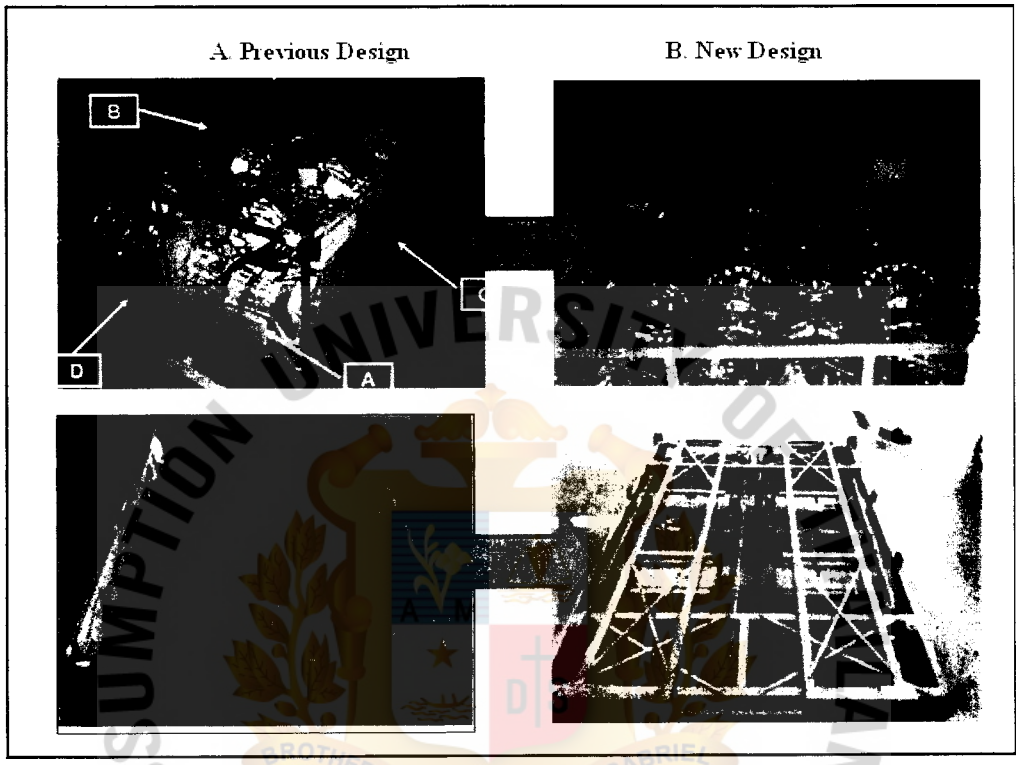
The purpose of observation is to check the quality and loading pattern of the transmissions and packages and review the current operation by the Indian supplier and both plants of TMT at the Thailand warehouse. The observation for 1st trial needs to confirm the package by quality control function and confirm the loading pattern by import and export function. All the concerned points will have to be discussed with all parties. The observation had to be done before sending the real shipment to TMT.

3.2 Initial Data Gathered from Documentary Reviews

3.2.1 General Information of New Returnable Packages

Indian Supplier have invested in designing and producing the new returnable package for transmission parts since the total cost of investment is cheaper than the TMT. The new transmission package is more useful and has longer life time stronger with no defect and rust, and easier to handle. The images of previous and new packages are shown in Figure 3.1 on the next page.

Figure 3.1: Transmission Package Image



Source: Author

3.2.2 Total Amount of the Products and Packages from the Indian Supplier

The total products from Indian suppliers are collected from January until June 2012. This data is recorded for six months because the data is the most update for the total products. The data does not fluctuate from last year and the data for six months is enough for estimating the returnable packages for each month. The total amount of the products is shown in Table 3.1.

Table 3.1: Total Product from the India Supplier from January to June 2012

Plant/Month	Total Product (Pieces) in 2012						
	January	February	March	April	May	June	Average
Somrong	6,469	8,808	7,067	5,394	6,790	6,081	6,768
Banpho	4,700	1,860	3,695	2,555	3,283	2,735	3,138
Total	11,169	10,668	10,762	7,949	10,073	8,816	9,906

Source: Computed from TMT data

Table 3.1 shows the total product from the India supplier from January 2012 to June 2012. This data from usage reporting of production control is done by separating Somrong and Banpho plants. The investment of each unit is USD 315.50.

Table 3.2: Used Packages of Returning to the India Supplier

Plant	Module/ Month	Module/ Ship
Somrong	565	141
Banpho	262	66
Total	826	207

Source: TMT data

Table 3.2 shows the returnable packages to the Indian supplier per month and per the shipment. This is done by calculation based on data from total products from the Indian supplier on Table 3.1 by separating Somrong and Banpho plants.

3.2.3 Total Logistic Cost and Labor Cost

The necessary data is the total cost of TMT is labor cost and logistic cost. The data are collected by import and export functions. The current labor cost and logistic cost are used to calculate the total cost of returning transmission packages back to the Indian supplier. The labor cost and logistic cost are shown in Table 3.3 and 3.4.

Table 3.3: The Labor Cost of Previous Package

Component	Total time/ Package (Minute)	Working hour/ Package (Minute)	Labor cost/ Package (USD)
Bottom frame	**8**	**0.04**	**0.32**
Side support	**15.6**	**0.04**	**0.62**
Top Lock	**10.7**	**0.04**	**0.43**
Total	**34.3**	**0.12**	**1.37**

Source: TMT data

Table 3.2 shows the labor cost of previous packages total lead time to separate one package is 34.3 minute, using two man power. The labor cost per one package is USD 1.37.

Table 3.4: The Logistic Cost for TMT

Component Cost	Somrong (USD)		Banpho (USD)	
	20-Feet	40-Feet	20-Feet	40-Feet
Transport	**153.10**	**153.10**	**270.49**	**271.13**
Custom Clearance	**54.23**	**54.23**	**54.23**	**54.23**
Transport Handle Charge	**102.08**	**124.40**	**102.08**	**124.40**
Port Charge	**29.76**	**29.76**	**29.76**	**29.76**
Total	**339.17**	**361.50**	**456.56**	**479.53**

Source: TMT data

Table 3.4 shows the logistic cost for TMT side by separating both plants and separating container sizes of 20-Feet and 40-Feet. The total logistic cost includes transportation cost, custom clearance, transport handling charge and port charge. Both sizes of the containers are standard for export shipment, so both sizes of containers can be used returning transmission packages back to the Indian supplier.

3.2.4 The Storage Area of the Transmission Package at the Warehouse

The warehouses at Somrong and Banpho plants gathers the empty packages from other countries. So the storage area of empty packages will be divided by the proportion of volume in each country. The proportion of returnable package form the Indian supplier is shown in Table 3.5.

Table 3.5: The Storage Area of Transmission Package for Somrong and Banpho

Plants	Total capacity (M^2)	Used Indian package capacity (M^2)	Indian stock area (%)
Somrong	104	28.34	27.25
Banpho	60	28.34	47.23

Source: TMT data

Table 3.5 shows the current storage area of the warehouse by separating Somrong and Banpho plants. The total capacity of Somrong warehouse is 104 M^2 but the area used for stocking Indian packages is 28.34 M^2. The percentage of the Indian stock area is 27.25 percent from the total capacity of the warehouse. The Banpho warehouse is 60 M^2 but the area used for stocking Indian packages is 28.34 M^2. The percentage of the Indian stock area is 47.23 percent from the total capacity of the warehouse.

3.2.5 The Total Lead Time of Returning Process

Figure 3.2: Total Lead Time of Previous Package

R/Rack Rotation Cycle			R/Rack Rotation Cycle		
A. **SAMRONG** PLANT			B. **BANPHO** PLANT		
1 **R/R** empty at **WHS**	9	days	1 **R/R** empty at **WHS**	9	days
2 Packing **&** Loading at India	12	days	2 Packing **&** Loading at India	12	days
3 **InlandTransportation**	1	days	3 **InlandTransportation**	1	days
4 Customs Clearance **&** Ship.	2	days	4 Customs Clearance **&** Ship.	2	days
5 Sea Trans port	9	days	5 Sea Transport	9	days
6 Customs Clearance	3	days	6 Customs Clearance	3	days
7 Land Transport	1	days	7 Land Transport	1	days
8 K-Line CY	9	days	8 **Banpho** CY	6	days
9 Importer's Local Storage	2	days	9 Importer's Local Storage	1	days
10 Unpacking	1	days	10 Unpacking	1	days
11 Folding empty **R/R** Storage	40	days	11 Folding empty **R/R** Storage	65	days
12 **Loading**	I	days	12 Loading	1	days
13 Inland Transport		days	13 Inland Transport		days
14 Customs Clearance **&** Shipping	3	days	14 Customs Clearance **&** Shipping	3	days
15 Sea Transport	9	days	15 Sea Transport	9	days
16 Customs Clearance **&** Unloading	3	days	16 Customs Clearance **&** Unloading	3	days
17 Inland Transport	1	days	17 Inland Transport	1	days
TOTAL DAYS	106	DAYS	TOTAL DAYS	127	DAYS

Source: Author

Figure 3.2 shows the total lead time for returning the returnable package to the Indian supplier. The Figure shows the different lead time used between the Somrong and the Banpho plants. The processes used in both plants are similar, but the total lead time for each plant is different. The total lead time for Somrong is 106 days and Banpho is 127 days. The differences are illustrated in Step 8 and 11 , because both processes depend on the total production of each plant. The volume of production for each plant is different. For Somrong the volume is more than Banpho plant. The total lead time for both plants is based on maximum lead time for each process. The details are as follows:

1. Empty packages at WHS: India receives the empty packages from the supplier and keeps it in the India warehouse waiting for packing operation. Maximum total lead time is 9 days

2. Packing and Loading at India : The next operation is packing and loading which depends on the order from TMT. Maximum total lead time is 12 days for completion of one container (27 packages with parts).
3. Inland transportation: After packing and loading operation the full container takes one day to the Chennai port wait for export custom clearance.
4. Custom Clearance & shiping: Then the full container goes thought the export custom clearance at the Chennai port the maximum total lead time is 2 days before actual time departure.
5. Sea transport: The current total lead time from Chennai port, India to Learn Chabang, Thailand port is 9 days. This total lead time does not include any delays of the vessel.
6. Custom Clearance: After actual time arrival the total lead time for import custom clearance is 3 days.
7. Inland transportation: The total lead time for land transportation from Leam Chabang to the yard is 1 day.
8. KLINE Container Yard & Banpho Container Yard: The total lead time for both plants are different for this process. Due to volume production for each plant, Somrong plant is 9 days and Banpho is 6 days. The containers are kept at the yard wait for the unloading process.
9. Importer's local storage: After unloading process the packages with parts, the packages are kept at the waiting area for the unpacking process. The total lead time for Somrong plant is 2 days and Banpho plant is 1 day. The total lead time for both plants are different for this process, due to the limitation at the ware house .Production has specified which containers will be used depending on first in, first out of the container and to avoid the extra charge.
10. Unpacking: This process takes only 1 day for both plants. The workers move packages with parts to the unpacking area (1 module can contain part for 10 pieces).
11. Folding empty (for 40-Feet container): After the unpacking process the workers move the empty packages back to the storage area for the folding process. Then the workers will keep the empty packages at the storage area in order to wait for allows containers follow the standard packing for each

component. The total lead times for both plants are different, due to the volume of production. The maximum total lead time for Somrong is 40 days and Banpho is 65 days.

12. Loading: One container has 24 packages each container follows the loading pattern. The total lead time for both plants is half day.
13. Inland transportation: This process is the same day with the loading process. Both plants take only half day for the loading process in order to bring the full container to the yard.
14. Custom Clearance & ship: The full container has go through the export custom clearance at the Learn Chabang Port which takes is 3 days before actual time departure.
15. Sea transport: The current total lead time from Learn Cha Bang port, Thailand to Chennai port, India is 9 days. This total lead time does not include any delay of the vessel.
16. Custom Clearance & Unloading: After actual time arrival in India take 3 days for custom clearance and the unloading process.
17. Inland transportation: The total lead time for land transportation from the Chennai port to the suppliers is 1 day.

3.3 Data Analysis

Data analysis is used to identify the current problems of the return of transmission steel packages from the TMT plants to its suppliers in India.

The data that is used for analyze is concerned with used packages which one returned back to Indian supplier. Total cost of returning packages back to the Indian supplier, the storage area at the ware house of each plant, and the total lead time of returning packages is analyzed.

The current operation for returnable packages back to the Indian supplier has separate complete loading containers. The current operation wasting time and long lead time to

return modules back to India occurs because of low production volume at the Banpho plant.

The new returnable packages for completing one container contain 104 empty packages which are for 40-Feet. The total of returning modules back to the Indian supplier at Banpho plant is only 66 modules per week. The data is shown in Table 3.2. To complete one container for standard size Banpho has to wait for two weeks while at Somrong takes one week to complete one container of the standard size.

3.4 Implement Business Process Reengineering

The steps to implement Business Process Reengineering (BPR) are given below:

1. Develop the business process by sharing the information to all parties about the merit of the project and make sure that all parties understand and agree to implement the returnable package project.
2. Identify the process to be redesigned: TMT and the Indian supplier think of redesigning the process of the new returnable module to reduce the total lead time of returning defected packages and to make easier to operate the new design. The new options identify the problems and identify the new options to select the best solution to minimize the total cost of the new route.
3. Understand and measure the existing process by identifying the new options to compare lead time and total cost of the new options.
4. Identifying information technology levels: this project does not need to identify the information and technology, since the problem is design of packages and is concerned with process as of the operation.
5. Design and build a model for the new process: select the best option from the new options and set up the new route.

3.5 Summary

All methodologies are explained in this chapter. First the required data and data collection are prepared by the Indian supplier and TMT from the document review, trial operation, and observations, Commitment to conclusion data and framework is required before starting the project. Then the statement of problem is frame worked, which is " How would business process reengineering strategy be implemented to redesign the returnable process of the transmission package effectively" by rethink the new operation for more profit in all parties? To study the feasibility of the new options for TMT, the total costs for new routing are comprised with the current operations and new operations that as better are chosen. And the new operations can optimization lead time.

CHAPTER IV

PRESENTATION AND CRITICAL DISCUSSION OF RESULTS

This chapter presents the application of business process reengineering (BPR) to analyze the data, identify the problems and propose the solutions to solve the problems. There are five steps involved in business process reengineering (BPR), the details are presented in the following sections.

4.1 Development of the New Business Process

The first step is to develop the business process and design of the transmission package. In this step, all parties already agree to develop the new business process and new design of transmission package, because they found many problems from the previous process and design. Both TMT and the Indian supplier agree to develop the new process and new design of transmission package together. However, as the new packages are already designed and produced by Indian suppler, the TMT has to come up with the practical process to return the package back to the India with on the shortest lead time and with the lowest cost. Thus, the new return process must be redesigned.

4.2 Identifying the Processes to be Redesign

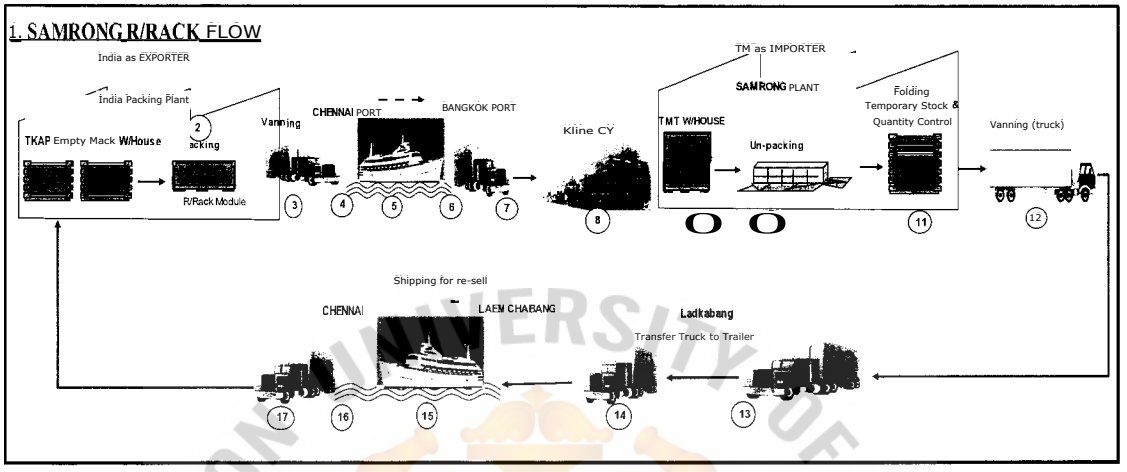
The next step is to identify the process to be redesigned of the returnable package. The previous process has three points of concern which are total lead time of return, the total cost and inventory control at the warehouse. All details are present as below.

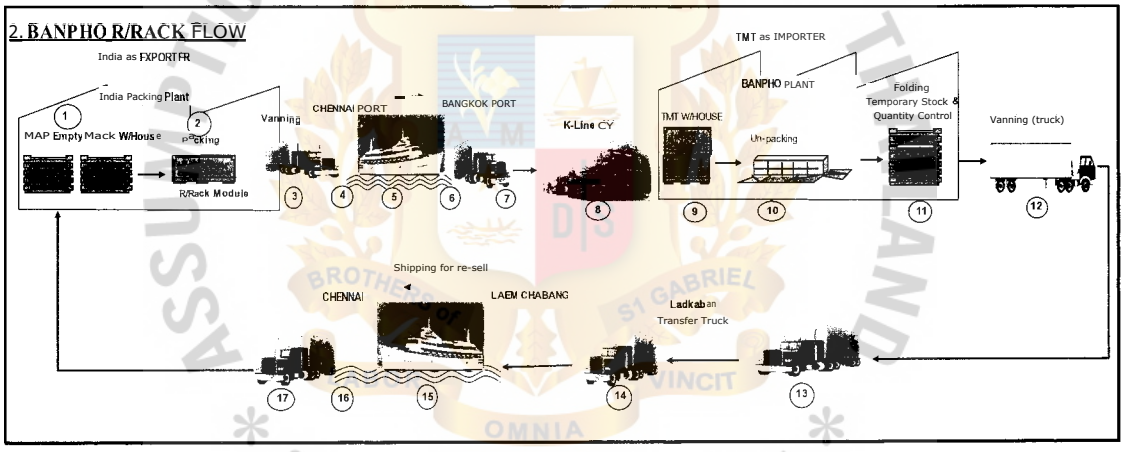
4.2.1 The Previous Total Lead Time of Returning

The previous operation of returning package back to the Indian supplier is separated at the Somrong and Banpho plants. The total lead time of each plant is different since the production volume is different. The Somrong plant is larger than that of the Banpho plant. The Banpho Plant has to keep the empty stock of packages longer than

the Somrong, because both plants use 40- Feet container. The flow and approximated lead time are shown in Figure 4.1:

Figure 4.1: The Previous Logistic Flow & Returning Lead Time





R/Rack Rotation Cycle				R/Rack Rotation Cycle			
A. SAMRONG PLANT				B. BANPHO PLANT			
1	R/R empty at WHS	9	days	1	R/R empty at WHS	9	days
2	Packing & Loading at India	12	days	2	Packing & Loading at India	12	days
3	Inland Transportation	1	days	3	Inland Transportation	1	days
4	Customs Clearance & Ship.	2	days	4	Customs Clearance & Ship.	2	days
5	Sea Trans port	9	days	5	Sea Trans port	9	days
6	Customs Clearance	3	days	6	Customs Clearance	3	days
7	Land Trans port	1	days	7	Land Transport	1	days
8	K-Line CY	9	days	8	Banpho CY	6	days
9	Importer's Local Storage	2	days	9	Importer's Local Storage	1	days
10	Unpacking	1	days	10	Unpacking	1	days
11	Folding empty R/R Storage	40	days	11	Folding empty R/R Storage	65	days
12	Loading	1	days	12	Loading	1	days
13	Inland Transport		days	13	Inland Transport		days
14	Customs Clearance & Shipping	3	days	14	Customs Clearance & Shipping	3	days
15	Sea Transport	9	days	15	Sea Trans port	9	days
16	Customs Clearance & Unloading	3	days	16	Customs Clearance & Unloading	3	days
17	Inland Transport	1	days	17	Inland Transport	1	days
	TOTAL DAYS	106	DAYS		TOTAL DAYS	127	DAYS

Source: Author

Figure 4.1 explains the previous logistic flow and total lead time for returning package to the Indian supplier. The figure separates the logistic flow between Somrong and Banpho plants. The logistic flow for both plant are similar, but the total lead time for each plant is different. The total lead time for Somrong is 106 days and the total lead time for Banpho is 127 days. The previous process of folding empty packages for each plant take long time to complete one container.

4.2.2. The Previous Total Cost of Returning Package back to Indian Supplier

The total cost for returning package back to the Indian supplier includes two segments, first is labor cost and second is logistic cost. The labor cost for previous operations is USD 3.77 per one package. This labor cost is calculated from steps of unpacking operations until the loading of empty packages to the stock area. The labor cost is USD 0.02 per minute and one package uses two man power for operate as shown in Table 4.1

Table 4.1: Previous Total Labor Cost

Component	Total time/ Package (Minute)	Working hour/Package (Minute)	Labor cost/ Package (USD)	Total/ Cont. (USD)
Bottom frame	**8**	**0.04**	**0.32**	**2.56**
Side support	**45.6**	**0.04**	**1.82**	**14.59**
Top Lock	**40.7**	**0.04**	**1.63**	**13.02**
Total	**94.3**	**0.12**	3.77	**30.18**

Source: TMT data

The second cost is TMT logistic cost. In the previous operations, there are separate loading containers for Somrong and Banpho Plants which are 40-Feet. The total logistic cost includes transportation cost, custom clearance, transport handle charge and port charge. The total cost for Somrong is USD 361.50 and USD 479.53 per container as shown in Table 4.2

Table 4.2: Previous Logistic Cost

Component Cost	Somrong (USD)	Banpho (USD)
	40-Feet	40-Feet
Transport	153.10	271.13
Custom Clearance	54.23	54.23
Transport Handle Charge	124.40	124.40
Port Charge	29.76	29.76
Total	361.50	479.53

Source: TMT data

4.2.3 The Previous Inventory Control at the Warehouse

The total module stock capacity for Somrong is 104 square meters and Banpho is 60 square meters. The total area used for empting the Indian packages is 28.34 square meters at both plants. Total stock has to keep all empty packages from all suppliers including the Indian supplier. So Banpho uses 47.23 percent of the total area to finish one container of 40-Feet. This operation is useless for the Banpho plant, since the capacity for keeping the empty packages at Banpho is less than Somrong as shown in Table 4.3.

Table 4.3: The Previous Capacity of Warehouse

Plants	Total capacity (M^2)	Used Indian package capacity (M^2)	Indian stock area (%)
Somrong	104	28.34	27.25
Banpho	60	28.34	47.23

Source: TMT data

From the above discussion, three problems of the previous operation are illustrated which are long total lead time of returning packages to the Indian supplier, total cost which include labor cost and logistic cost which are high and the area used for empty packages at Banpho is useless. So to understand and measure the previous process and compare its with the new option is important.

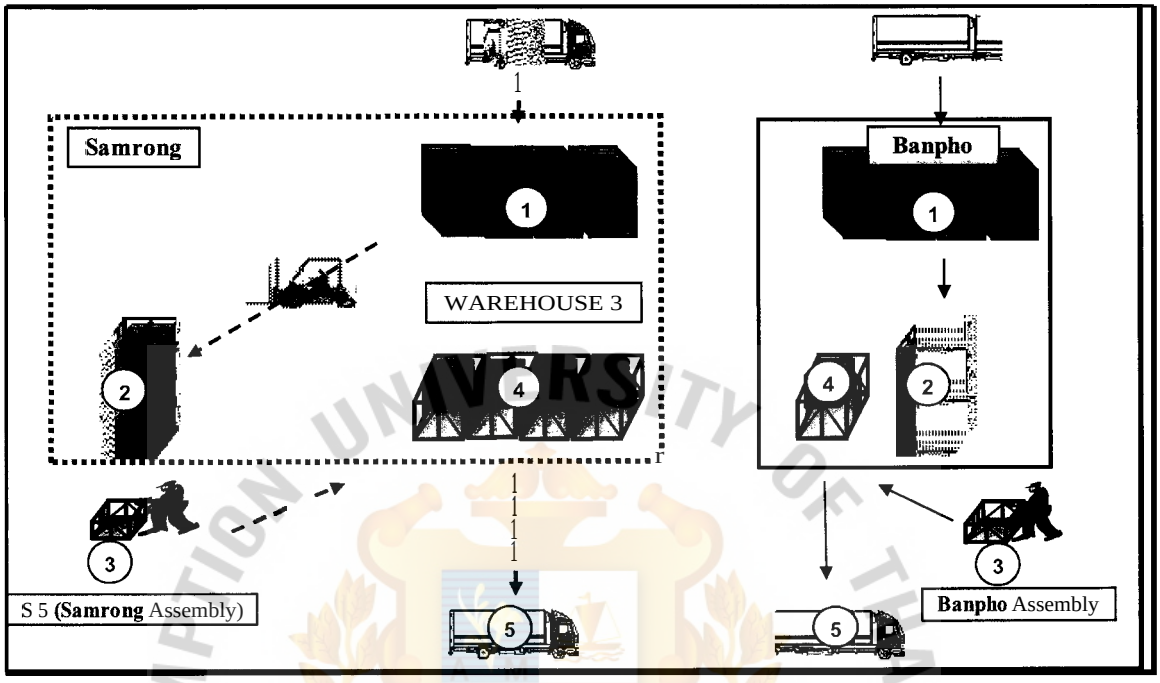
4.3 Understand and Measure the Existing Process

The third step of the business process reengineering (BPR) is to understand and measure the existing process by creating the possible options and selecting the best option to set up the better route to solve all the problems that have been mentioned. There are three options which are given below.

4.3.1 Option 1: Separate Loading by Using 40- Feet Container.

The first option is to separate loading for both plants by using 40-Feet containers which is same as previous operation. The operation flow shown in Figure 4.2 explains the unpacking of empty packages of the Indian supplier unpacking parts the empty packages have to be kept separately for each plant to wait for the complete container size of 40-Feet. The capacity for one container is 104 packages for new design.

Figure 4.2: Unpack Empty Package of Indian Supplier for Separate Loading Container by Using 40-Feet Container



Source: Author

The total lead time of the new design is reduced from the previous as shown in Table 4.4. The total lead time for Somrong is 73 days and the total lead time for Banpho is 76 days. The total lead time has reduced is shown in Figure 4.1 since this total lead time used with the new design of returnable packages. The new designs of package are easier to operate, and can reduce the lead time of folding empty R/R storage for both plants. But the total lead time of each plant is still different since volume production for each plant is different. The lead time for both plants is base on maximum lead time for each process.

Table 4.4: Total Lead Time of Separate Loading by using 40-Feet Container

R/Rack Rotation Cycle				R/Rack Rotation Cycle			
A. SAMRONG PLANT				B. BANPHO PLANT			
1	R/R empty at WHS	9	days	1	R/R empty at WHS	9	days
2	Packing & Loading at India	12	days	2	Packing & Loading at India	12	days
3	InlandTransportation	1	days	3	InlandTransportation	1	days
4	Customs Clearance & Ship.	2	days	4	Customs Clearance & Ship.	2	days
5	Sea Transport	9	days	5	Sea Trans port	9	days
6	Customs Clearance	3	days	6	Customs Clearance	3	days
7	Land Transport	1	days	7	Land Transport	1	days
8	K-Line CY	9	days	8	Banpho CY	6	days
9	Importer's Local Storage	2	days	9	Importer's Local Storage	1	days
10	Unpacking	1	days	10	Unpacking	1	days
11	Folding empty R/R Storage	7	days	11	Folding empty R/R Storage	14	days
12	Loading		days	12	Loading		days
13	Inland Trans port		days	13	Inland Transport		days
14	Customs Clearance & Shipping	3	days	14	Customs Clearance & Shipping	3	days
15	Sea Trans port	9	days	15	Sea Trans port	9	days
16	Customs Clearance & Unloading	3	days	16	Customs Clearance & Unloading	3	days
17	Inland Trans port	1	days	17	Inland Transport	1	days
	TOTAL DAYS 73 DAYS				TOTAL DAYS	76 DAYS	

Source: Author

The total cost of this option is calculated by using the total used packages of those are returned to the Indian supplier as shown in Table 4.5, logistic cost per container as shown in Table 4.6 and labor cost as shown in Table 4.7. The total time to operating the new packages takes 12 minute per package, and the labor cost for operate packages per minute is USD 0.02, so one package will cost USD 0.24 . The data of used modules returned to the Indian supplier are the data are recorded for six months. This data is the most update data that is calculated from the total products of the Indian supplier from January 2012 to June 2012. The average of the total containers used for packages returned for Somrong is five and Banpho is three.

Table 4.5: Containers Used for Packages Returning by Using 40-Feet Container

Plant/Month	Number of 40-FT Container per Month (in 2012)						
	January	February	March	April	May	June	Average
Somrong	5	7	6	4	5	5	5
Banpho	4	1	3	2	3	2	3

Source: TMT data

Table 4.6: Logistic Cost for Separate Loading by Using 40-Feet Container

Component Cost	**Somrong** (USD)	**Banpho** (USD)
Transport	153.10	271.13
Custom Clearance	54.23	54.23
Transport Handle Charge	124.40	124.40
Port Charge	29.76	29.76
Total	361.50	479.53

Source: Computed from TMT data

Table 4.7: Total Labor Cost for Separate Loading by Using 40-Feet Container

Plants		Cost per Package		Cost per Container (USD)
	Lead time (Minute)	Working hour (Minute)	Labor cost (USD)	
Somrong	12	0.02	0.24	24.96
Banpho	12	0.02	0.24	24.96

Source: Computed from TMT data

Table 4.8 shown the assumption for option one is to separate loading for both plants by using 40-Feet containers and calculating from total product of Indian suppliers as shown in Figure 3.1 in chapter three. The total includes TMT inland cost per month,

labor cost per month and sea freight cost from Thailand to India is USD 1,370 per 40-Feet container. The total returning of module is 832 and the total logistic cost is 25,166.09 USD per month.

Table 4.8: Total Cost for Separate loading by using 40-Feet Container

Plant	Total module return	**TMT** inland cost / Month (USD)	Labor cost / Month (USD)	Sea freight/ Month (USD)	Total cont.
SOMRONG (40 FT)	520	1,807.50	124.80	6,850.00	5
BANPHO (40 FT)	312	1,438.59	74.88	4,110.00	3
TOTAL	832	3,246.09	199.68	10,960.00	25,166.09

Source: Computed from TMT data

Table 4.9 shows the capacity of the option one is separate loading between Somrong and Banpho plants by using 40-Feet containers. The total module stock capacity for Somrong is 104 square meters and Banpho is 60 square meters. The total used area for empty packages of the Indian packages is 28.34 square meters for both plants. The percentage of used Indian package capacity for Somrong is 27.25 percent and Banpho is 47.23 percent .

Table 4.9: The Capacity of Warehouse for Separate Loading by using 40-Feet Container

Plants	Total capacity (M^2)	Used Indian package capacity (M2)	Indian stock area **(%)**
Somrong	104	28.34	27.25
Banpho	60	28.34	47.23

Source: TMT data

4.3.2 Option 2: Separate Loading by using Different Container Size

The operation flow of this option is same as Figure 4.2 the flow shown that the unpacked empty packages of the Indian supplier are parts of the empty packages have to kept separately for each plant in order to wait for the complete container of size 40-Feet for the Somrong plants. The container size for Banpho plant is changed from 40-Feet to 20-Feet container. The capacity for 40-Feet container is 104 packages and 39 packages for 20-Feet with the new design. This option is to reduce the total lead time of Banpho plant by changing the container size from 40-Feet to 20-Feet this reduces the capacity in the warehouse also.

The total cost of this option is calculate by using the total used packages returned to the Indian supplier as shown in table 4.10. Logistic cost per container is shown in Table 4.11 and labor cost is shown in Table 4.12. The total time to operate the new package is 12 minute per package, The labor cost for operating packages per minutes is cost USD 0.02, so one package will cost USD 0.24. The data of used modules returned to the India supplier are the data is recorded for six months. This data is the most updated data that is calculated from the total product of the Indian supplier from January 2012 to June 2012. The average of the total returned for Somrong is 5 for the 40-Feet containers and Banpho is 7 for the 20-Feet containers.

Table 4.10: Used Packages of Returning to India Supplier for Separate Loading by Using 40-Feet for Somrong and 20-Feet for Banpho

Plant/Month	Number of 40-FT Container per Month (in 2012)						
	January	February	March	April	May	June	Average
Somrong	**5**	**7**	**6**	**4**	**5**	**5**	**5**
Banpho	**10**	**4**	**8**	**5**	**7**	**6**	**7**

Source: Computed from TMT data

Table 4.11: Logistic Cost for Separate Loading by Using 40-Feet for Somrong and 20-Feet for Banpho Container

Component Cost	Somrong (USD)	Banpho (USD)
	40-Feet	20-Feet
Transport	153.10	270.49
Custom Clearance	54.23	54.23
Transport Handle Charge	124.40	102.08
Port Charge	29.76	29.76
Total	361.50	456.56

Source: Computed from TMT data

Table 4.12: Total Labor Cost for Separate Loading by Using 40-Feet for Somrong and 20-Feet for Banpho Container

Plants	Cost per Package			Cost per Container
	Lead time (Minute)	Working hour (Minute)	Labor cost (USD)	(USD)
Somrong	12	0.02	0.24	24.96
Banpho	12	0.02	0.24	9.36

Source: Computed from TMT data

Table 4.13 shows those the assumption for option two is to separate loading for both plants by using 40-Feet containers for the Somrong and 20-Feet containers for the Banpho plants by calculating from the total product of the Indian supplier as shown in Figure 3.1 in chapter three. The total includes TMT inland cost per month, labor cost per month and sea freight cost from Thailand to India is USD 1,370 for 40-Feet containers and USD 910 for 20-Feet per containers. The total returned is 793 and the total logistic cost is 18,223.42 USD per month.

Table 4.13: Total Cost for Separate Loading by Using 40-Feet for Somrong and 20-Feet for Banpho Container

Plant	Total module return	**TMT** inland cost / Month (USD)	Labor cost / Month (USD)	Sea freight/ Month (USD)	Total cont.
SOMRONG (40 FT)	520	1,807.50	124.80	6,850.00	5
BANPHO (20 FT)	273	3,195.92	65.52	6,370.00	7
TOTAL	793	5,003.42	190.32	13,220.00	18,223.42

Source: Computed from TMT data

Table 4.14 shows that the capacity of the option two is to separate loading between the Somrong and Banpho plants by using 40-feet containers for Somrong and 20-feet containers for Banpho. The total module stock capacity for Somrong is 104 square meters and Banpho is 60 square meters. And the total use area for empty of the Indian packages for Somrong is 28.34 square meters and Banpho is 13.85 square meters after changing the container size. The percentage of used Indian package capacity for Somrong is 27.25 percent and Banpho is 23.10 percent.

Table 4.14: The Capacity of Warehouse for Separate Loading by using 40-Feet for Somrong and 20-Feet for Banpho Container

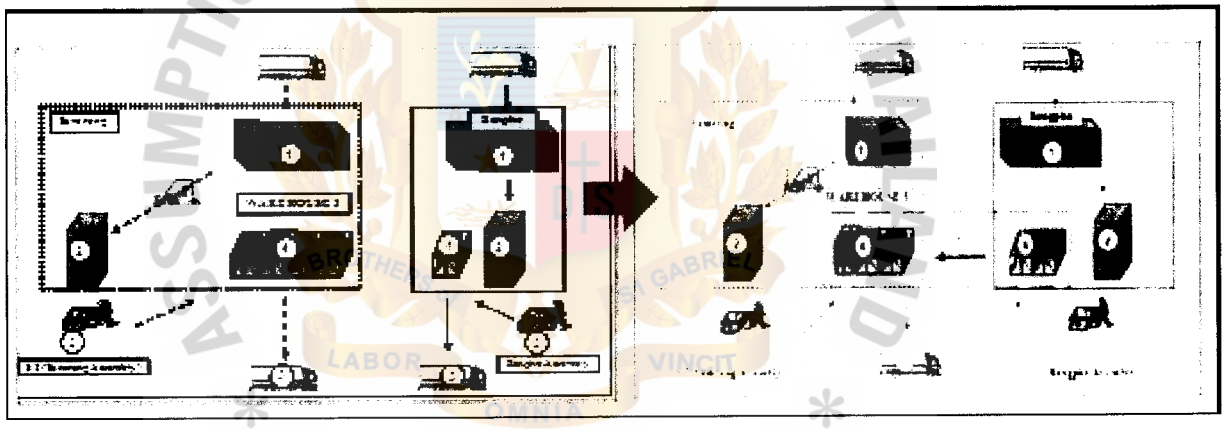
Plants	**Total capacity (M^2)**	**Used Indian package capacity (M^2)**	**Indian stock area (%)**
Somrong	**104**	**28.34**	**27.25**
Banpho	**60**	**13.85**	**23.08**

Source: Computed from TMT data

4.3.3 Option 3: Mix Loading

The operation flow of this option is shown in Figure 4.3. The unpacked empty packages of the Indian supplier that from Banpho will be delived to Somrong to be mixed put in the container by of 40-feet . The capacity for 40-Feet container is 104 packages with the new design. This option is to reduce the total lead time and capacity for warehouse at thee Banpho plant by delivering empty packages from Banpho to Somrong plants using six wheel trucks, with the capacity of 39 packages per one truck.

Figure 4.3: Compare Unpack Empty Package of Indian Supplier with Previous Process and New Process



Source: Author

The calculation of the total cost of this option is done by taking the total used packages returned to the Indian supplier as shown in Table 4.15, logistic cost per container as shown in Table 4.16 and labor cost in Table 4.12. The total time to operate the new package is take 12 minute for one package. The labor cost for operating package is cost USD 0.24. The data used modules of returned to the India supplier are the data that is recorded for six month. This data is the most updated data that is calculate from total product from Indian supplier from January 2012 to June 2012. The average of the total returned for Somrong is 7 for 40-Feet containers but

after mixed loading with Banpho, 7 trucks (which can contain 39 packages per truck used).

Table 4.15: Used Packages of Returning to India Supplier for Mix Loading by Using 40-Feet at **Somrong**

Plant/Month	Number of 40-FT Container per Month (in 2012)						
	January	February	March	April	May	June	Average
Somrong	5	7	6	4	5	5	5
Banpho	11	4	9	6	8	6	7

Source: Computed from TMT data

Table 4.16: Logistic Cost for Mix Loading by Using 40-Feet Container at **Somrong**

Component Cost	**Somrong (USD)**	**Banpho (USD)**
	40-Feet	Milk run
Transport	153.10	70.65
Custom **Cleance**	54.23	-
Transport Handle Charge	124.40	-
Port Charge	29.76	-
Total	361.50	70.65

Source: Computed from TMT data

Table 4.17 shows the assumption for option three to mix loading between Somrong and Banpho plants by using 40-Feet containers by calculating the total product from the Indian suppliers as shown in Figure 3.1 in chapter three. The total cost includes TMT inland cost per month, labor cost per month and sea freight cost from Thailand to India which is USD 1,370 per 40-Feet container. The total of returned packages is 793 and the total logistic cost is USD 12,615.05 per month

Table 4.17: Total Cost for Mix Loading by using 40-Feet Container at Somrong

Plant	Total module return	**TMT** inland cost / Month (USD)	Labor cost / Month (USD)	Sea freight/ Month (USD)	Total cont.
SOMRONG (40-FT)	520	2,530.50	124.80	9,590.00	7
BANPHO (Truck)	273	494.55	65.52	0.00	0
TOTAL	793	3,025.05	190.32	9,590.00	12,615.05

Source: Computed from TMT data

Table 4.18 shows the capacity of the option three is mixed loading between Somrong and Banpho plants by using 40-Feet containers at to Somrong plant. The total module stock capacity for Somrong is 104 square meters and Banpho is 60 square meters. The total used are for the empty packages of the Indian supplier at for Somrong is 28.34 square meter and Banpho is 13.85 square meters after delivering the empty packages from Banpho to Somrong. The percentage of used Indian package capacity for Somrong is 27.25% and Banpho is 23.10%.

Table 4.18: The Capacity of Warehouse for Mix Loading by using 40-Feet Container at Somrong

Plants	**Total capacity (M^2)**	**Used Indian package capacity (M2)**	**Indian stock area (%)**
Somrong	104	28.34	**27.25**
Banpho	60	13.85	**23.08**

Source: Computed from TMT data

4.4 Selecting the Best Option

The last step of step involved in the business process reengineering (BPR) is selecting the best option form the three possible options that are mentioned in Topic 4.3 and

understanding measuring the existing process. All details are presented in the Table 4.19 in the following section.

Table 4.19: Summary the Best Solution of the Three Possible Options

Option	TMT Inland cost / Month	India Supplier Inland cost	Total module return/ Month	Total cost	Average cost / modules	Priority
1	25,166.09	1,632.00	832	26,798.09	32.21	3
2	18,223.42	2,448.00	793	20,671.42	26.07	2
3	**12,615.05**	**1,428.00**	**793**	**14,043.05**	**17.71**	**1**

Source: Computed from TMT data

Table 4.19 explains the solution of each possible option including TMT inland cost per month, The Indian supplier inland cost for both sizes of containers is the same cost which is USD 204 per container, and includes total module return per month for each option, total cost and the average cost per module. The best solution is the option 3 mix loading by delivery to Banpho and Somrong plants, because the final average cost per module the lowest compared to the other and options.

Table 4.20: Summary the Best Solution of the Three Possible Options for Total Lead Time of Returning Package.

Option	Somrong (days)	Banpho (days)	Average (days)
1	73	76	75
2	73	69	71
3	**71**	**53**	**62**

Source: Computed from TMT data

Table 4.20 shows the best solution of the three options for total lead time of returned packages back to the Indian supplier. The least total lead time is in option 3 which is an average of is 62 days.

Table 4.21: Summary the Best Solution of the Three Possible Options for the Capacity of the Warehouse

Option	Indian stock area (%)		Average (%)
	Somrong	Banpho	
1	27.25	47.23	37.24
2	27.25	23.08	**25.17**
3	27.25	23.08	**25.17**

Source: Computed from TMT data

Table 4.22 shows the solution of the summary and the best solution of the three options for the capacity of the warehouse. The result is option 2 and 3 used the least area for keeping the returnable packages. The average of the area is 25.17 percent of the total capacity of the warehouse.

4.5 Summary

The business process reengineering methods are use to identify the problem and identify the options to select the best option for setting the route of returning package back to the Indian supplier by following the steps involved in the business process reengineering. The best option is option 3 which is mix loading by delivering returnable packages from Banpho to the Somrong plants. The new route of returning packages back to the Indian supplier will reduce the total cost, total lead time and usefulness of the warehouse.

CHAPTER V

SUMMARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter provides three main sections of the results of using business process reengineering in the Auto Parts Company. The first section is the conclusion and discussion. The second is conclusion. And the last section is the managerial implications.

5.1 Conclusions and Discussion

This study is intends to implement the returnable packages back to India suppliers effectively by appling to Business Process Reengineer (BPR) process. The problems are the total used module between Somrong and Banpho plants are difference, so the Banpho plants wastes time for waiting for the complete container of size 40-feet. This problem sometimes make the storage area over flow and Banpho can not use area be worth.

The amount of total products from the Indian supplier from January 2012 to June 2012 is use to calculate the used packages returned to the Indian supplier per month and per shipment. Banpho takes around two week to complete one container while Somrong take only one week to complete one container, because the number of return packages for Banpho is not enough with a container size 40-feet.

Business Process Reengineering (BPR) concept is matchs with the idea of is project and can be applied to the process of implementing the returnable module effectively. By following step by step of the business process reengineering (BPR) the company can understand and measure the existing process by setting up the new options to compare the total cost and the lead time with other options. The minimum cost of returned package back to India is option 3. By combining the loading operation

between the Somrong and the Banpho plants, not only helps to save costs , but also helps with to be lead time reduction.

Table 5.1: Comparing the Previous Process with the Best Option

Factor / Cont.	Previous Process	Best option	Merit
Total lead time (days)	117	62	55
Total logistic cost (USD)	420.52	216.08	204.44
Total labor cost (USD)	30.18	9.36	20.82
Capacity of warehouse (%)	37.24	25.17	12.07

Source: Computed from TMT data

Table 5.1 shows the means after comparing the previous process with the best option. The means of the best option includes total lead time per container. This is reduces to 55 days, the total logistic cost will be reduced by USD 204.44 per containers, total labor cost will reduced by 20.82 per container, and the average percentage of Indian packages capacity will be reduced by 12.07 percent.

The propose of this study is "How would business process reengineering strategy be implemented to redesign the returnable process of the transmission package effectively". By following the business process reengineer process (BPR) helps to identify the process to be redesign, understand and measure the existing process and design and build a model of new process. After measuring the excising process TMT can select the best solution as shown above in Table 5.1 TMT has to set up the new process to achieve the target for more cost saving and lead time reduction.

5.2 Managerial Implications

After TMT makes the decision from the new options the last step involved in business process reengineering (BPR) is to set up to new operation by following the step of the Business Process Reengineering (BPR):

- Set up the new operations first by sharing the project with the management to acknowledge the target of this project. TMT managers should focus more on the new route and closely monitor to receive and the return process.

- The next step is to set up the meeting with two plants and all accessories to implement and set up the schedule to start the new operation. Both plants must train their operation staff to understand how to fold the new returnable packages and how to do the operation when the total is complete.

- After implementing import and export functions the company has to keep record of the payment of logistic cost and provide the shipping schedule of returning modules back to the India supplier in order to forecast three moths to see that TMT can reduce total lead time as the target or not. TMT has to closely follow up the new operations every week until the process is stable.

- Somrong and Banpho plants should have monthly meeting to share the progressive and problems at each plant to "Kaizen" the process until the process is stable.

5.3 Recommendations for Future Research

The work in business process reengineering of an Auto Parts Company does not end with the best solution of the new option. The process needs continuous improvement by updating the all information such as logistic cost or total lead time and sharing the information to make a future plan. Hence, future research should focus more on forecasting the total product from the Indian supplier in terms of estimating the total returned packages for future plans.

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