



**BUSINESS PROCESS REENGINEERING IN LOGISTIC  
ACTIVITIES OF A STEEL CYLINDER MANUFACTURER**

By

**SITTHIKORN ISSARANGURA NA AYUDHYA**

**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**

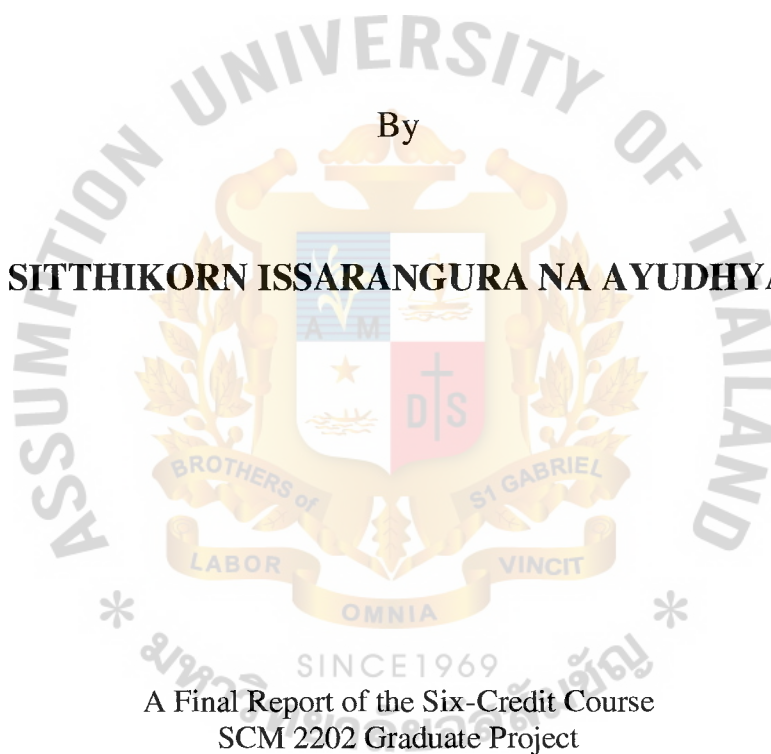
**Martin de Tours School of Management  
Assumption University  
Bangkok, Thailand**

**March 2012**

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Martin de Tours School of Management  
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March, 2012

**Assumption University**  
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**Declaration of Authorship Form**

I, Sitthikorn Issarangura Na Ayudhya, 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 REENGINEERING IN LOGISTIC ACTIVITIES OF A STEEL CYLINDER MANUFACTURER**

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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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Sitthikom Issarangura Na Ayudhya

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March, 2012

## ABSTRACT

This research is the start of Company XYZ to apply Supply Chain Management Business Process Reengineering (SCM-BPR) technique to improve its business process since the production delay and inventories problems are the common problem of the Company. To solve these problems, Company XYZ needs to understand the nature of the problem and current business process flow. Hence, the problem statements are ***“How could the BPR solve communication/information flow problems among departments in XYZ?”***

On year 2011, sales and capacity of Company XYZ were dramatically increasing. These increases of sales also increase the problem of late delivery and inventory turnover lead time. As such, companies were discussing the solution to solve this delay problem with lowest cost. Thus, SCM-BPR technique was select to analyze the problem and propose the solution. Result from research show that the problems of delay cause from lack of communication between sales, production and logistic departments. The key information that has the problem of miscommunication was production schedule. Unreliable production schedule cause sales and logistic plan which lead to miscommunication with customers and suppliers. The solution by apply cross functional team and single data format. The use of the intranet server was introduced to transparent information. The expect result was reduce process lead time and accuracy of production schedule. The results then lead to the reduction of delivery delay and inventory problem,

The interviews with the two business owners and three department managers indicated that the long term relationships keep them do their business together with the customer. However, they have confirmed that the businesses of both parties would run more efficiently if the problem of delay is reduced.

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**Form signed by Proofreader of the Graduate Project**

I, Asst. Prof. Dr. June Bernadette D'Souza, has proofread this Graduate Project entitled  
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Mr. Sitthikorn Issarangura Na Ayudhya

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.

Signed

(Asst Prof Dr. June Bernadette D'Souza)

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Date:

17<sup>th</sup> August 2012.



# **CHAPTER I**

## **GENERALITIES OF THE STUDY**

International business and globalization trends are dramatically increasing. As global sourcing and international trading become a common practice, firms have to adjust themselves to deal effectively with the changing world. The improvement of logistics and transportation in terms of production and delivery lead time, product availability and total logistics cost would help increase competitive advantages over the competitors in this business context.

The firm that is able to manage logistic functions effectively would gain more competitive advantages than others in the industry. In order to organize and manage logistic functions properly, the firm needs to have clear communication and information flow.

Just like other industries, high competition is found in the steel cylinder manufacturing companies as well. Competition in the steel cylinder market are increasing dramatically nowadays. In order to survive in this environment, the firm needs to emphasize not only on the product quality but also on the competitive price and service response to satisfy customers i.e. to provide best quality with lowest cost. As the price wars are increasing in all countries all the time, the firms with less operation costs would gain more competitive advantages and be able to survive in this business. As the price of the major raw materials vary based on the world price, the logistics cost would play an important role that affects the total cost of the firm.

## **1.1 Background of the Research**

The XYZ Steel Cylinder Manufacturing Firm is a steel cylinder manufacturer that has operated its business for more than 30 years. The main product is the steel pressure containers. XYZ produces 2-piece and 3-piece steel cylinders with 480 Bar pressure tolerance. The products vary by the usage of objectives such as liquid petroleum gas cylinders, auto-tanks, Ammonia cylinders, refrigerant cylinders. XYZ has the biggest capacity of the production in Asia and has been ranked as one of the first five biggest steel cylinder manufacturers in the world. With more than 30 years experience in this field, XYZ is well recognized by global customers for excellent quality and reliability. The portion of the customers of XYZ is 30 percent domestically and 70 percent internationally. XYZ exports 50 x 40 feet High Cube on an average each week. XYZ has over 800 employees working in offices and factories. The firm run 6 days a week to reach the customer demands, which is 100 percent made to order. As the customers have different designs, requirements, and standards of the cylinders, customer demands are hard to predict. Demand forecasted made by XYZ marketing team is ineffective and unreliable which makes it hard to plan for the production and delivery. The production, inventory stocks, containers and loading tasks and delivering schedules are not congruent. Thus, the excessive logistics cost and late delivery are the major problems of the XYZ always.

## **1.2 Statement of the Problem**

For several years that XYZ has faced an increase in unnecessary expense from Logistic activities. XYZ is facing the problem of unbalancing stock, delay on delivery product and documents. The stock of XYZ is unstable. During each week, stock needs to be kept for the container from the shipping line which some time comes late and causes late delivery. During some periods, the stock overflows and effects the production in the sense that the storage area has no enough space for the in coming products from the production which, in turn, leads to the delay of the production. These problems do not only provoke customer dissatisfaction but also increase the cost from penalty charge.

The major operation problems of the XYZ are about communication and information flow because the information is delayed and missing. The problems occur based the ineffective system of the flow of the information especially between the production and the sales department. This causes a difficult for the logistics department to serve both production and sales departments and have their logistics tasks done well with less excessive cost and time. Miscommunications between the two departments do not only induce the unnecessary logistics expense to the XYZ but also reduce customer satisfaction. Hence, the Business Process Reengineering (BPR) is of interest as the concept involves rethinking and redesigning of the business process which aims to achieve an improvement on overall performance such as cost, quality and service.

Therefore, the question, “How could the BPR solve communication/information flow problems among departments in XYZ?” is concentrated in this study.

### **1.3 Research Objectives**

To attain the goals of the study, four objectives are set as follows;

- To identify logistics processes of the XYZ Steel Cylinder Manufacturing firm
- To understand the major problems and the possible causes of the problems in the communication/information flow among departments of the XYZ
- To propose the problem solving process based on the BPR concepts
- To compare and contrast the results obtained using BPR

### **1.4 Scope of the Research**

This research is based on the case study of the Steel Cylinder Manufacturing firm. The data will be gathered via several means i.e. observations, interviews, and documentary reviews. The process mapping of the flow of physical goods and information together with the working process will be identified. The problems and their causes of communication/information flow of XYZ will be analyzed. Then, the

BPR concept will be applied to solve those problems. The traditional and new proposed BPR process will be compared and contrasted.

### **1.5 Significance of the Research**

XYZ could gain both direct and indirect benefits from applying BPR technique with regard the logistics cost reduction which, in turn, would increase the margin for the firm. The increase in efficiency of the communication process between production and sales will reduce the problem of the stock management for the logistic department. In general, the reduction of cost of logistics leads to the improvement of competitive advantage in the market.

Managers and/or entrepreneurs of other firms that are interested in this technique can use this research results as a guideline to implement BPR to improve their communication and information processes.

### **1.6 Limitations of the Research**

Only BPR concept is selected in this research based on the requirement of the management team. Thus, its results may be limited comparing to those results that may be obtained using other techniques. Moreover, as each firm has different operational processes, the results of this research may not be applicable to other firms and other industries.



## 1.7 Definition of Terms

<b>Business Process Reengineering (BPR)</b>	The fundamental rethinking and redesigning of the business processes which aims on achieving an improvement in the overall performance such as cost, quality and service (Yin, 2010).
<b>Cross functional team</b>	A group of people with different functional expertise working toward a common goal (Krajewski & Ritzman, 2005).
<b>Information flow</b>	The path that data takes from its original setting to its end users, which involves transmitting orders information and updating the status of delivery (Sunil & Peter, 2012).
<b>Logistic management</b>	The management of the flow of goods between the point of origin and the point of destination which involves the integration of information, transportation, inventory, warehousing, material handling, and packaging, and often security (Sunil & Peter, 2012).
<b>Process mapping</b>	The process chart that shows the activities involved in defining exactly what a process entity does, who is responsible, to what standard a process should be completed and how the success of a process can be determined (Sunil & Peter, 2012).

## **CHAPTER II**

### **REVIEW OF RELATED LITERATURE**

This chapter reviews literature about 2 processes which are the operational procedures of the manufacturers and the business process reengineering. Both concepts and applications of the business process reengineering are discussed in details.

#### **2.1 Operational Procedure of the Manufacturer**

Operational processes are the processes that constitute the core business and create the primary value stream of the company. Typically, operational processes of the manufacturer are purchasing, manufacturing, advertising and marketing, and sales. These activities contribute the flow of the raw material procurement to the production and delivery of the finished goods to the customer. The reviewing of operational procedures of the manufacturer is extremely important to the firm who seeks to improve their performance i.e. cost reduction and increasing customer satisfaction as its dealing with the majority of cost and quality of the product for the customer.

Operational procedures refer to the working processes that are conducted or followed in the organization. The procedures includes the activities to be performed in order to facilitate all functions and control the quality system (Koss, 2005). Regularly, operational processes are the fundamental program of the action process, analytical process, manufacturing process and process for maintaining and calibrating the machine.

Cheneski (2003) studied the benefits of using operational procedures which are reduction on the variations of the process and increasing quality through the consistent implementation of a process procedure within the firm. It also minimizes the miscommunication and is used as a reference for any dispute solving. Thus, to improve the performance of the firm, the focus on operational procedures should be

conducted. As the working structure and process work flow (include communication flow) are a part of the BPR operating procedures, and improvement is necessary.

## **2.2 Business Process Reengineering (BPR)**

Four subsections of the BPR are reviewed. Initially the definition and critical appraisal of the BPR are the focus, followed by the benefits of implementing and the application of the BPR. Finally, the development of BPR model in SCM is reviewed.

### ***2.2.1 Definition and critical appraisal of Business Process Reengineering (BPR)***

Business Process Reengineering (BPR) is defined by many researchers and practitioners as a way to improve supply chain management. BPR aims to reengineer the process to increase the efficiency of the work flow. BPR works as a tool for critical rethinking, redesigning and reorganization with the support of IT in order to optimize the current process. It helps improve the customer satisfaction, quality of the product, cost and cycle time (Yin, 2010). Hammer and Champy (1993) supported this concept by concluding that the benefits of success using BPR is an increase in overall performance such as cost, quality, service and speed of the process. In addition, Mansar and Reijers (2007) differentiated redesign from reengineering in that the reengineering assumes a much broader scope while redesign has a more specific focus. Reengineering covers and restructures all aspects the organization process while the process redesign is concerned with how to articulate a process.

Many companies are confused between BPR and Total Quality Management (TQM) due to the similarity of using the same tools and providing the same outcomes. However, BPR and TQM are mainly different in two aspects. Firstly, TQM focused on the improvement of the continuous performance while BPR is focuses on the change of the process by breaking the rules on any fundamental assumption of the operations (Bond & Guimaraes, 1996; Choi & Chan, 1997). Secondly, while the outcome of TQM focuses on the improvement of the quality, the outcome focus of BPR are more on the increase of the effectiveness of the achievement of company's

management, administration and operational jobs (Choi & Chan, 1997). This concept is supported by Sethi and King (1998). That the redesign business activities, which result from questioning status, are effective ways to reach the objective and have successful improvement.

However, many researchers concluded that main characteristics and achievement of BPR is to redesign the process. Yin (2010), emphasizes on 4 related elements as given below:

- A Focus on Business Process
- A questioning of the status Quo
- Specific Objectives
- Breakthrough achievement

However, the fifth element, cultural change, was later introduced by Sethi and King (1998).

### **2.2.2 Benefits of implementing BPR**

The benefits of using BPR, basically, are the improvement of the overall performance such as cost, quality and speed of the service. The benefits of implementing BPR were expressed by many scholars (Yin, 2010; Glykas & Valiris, 1999; Oneill & Sohal, 1998) as below:

- Employee understands and is aware of the need for continuous improvement
- The continuous fundamental rethinking
- BPR Philosophy will increase the success of the organization
- Improvement of the communication, coordination and control inside the organization
- Increase productivity in term of more quality of the product, services
- Decrease production cycle time and work flow time



- Improve inventory by reducing the stock and introduce more product turnover from the inventory which in turn, reduces the inventory cost
- Increase overall profitability and the economic growth

The overall increase in performance shows an increase of customer satisfaction which in turn, would affects the reputation of the company. As global competition tense increases and changes very fast, it forces the company to improve itself to be the world's best. The company has to adapt itself fast in order to keep up with the changing environment (Wiendahla, ElMaraghyb, Nyhuisa, Zähc, Wiendahld, Duffiee, & Briekea, 2007).

### **2.2.3 Application of BPR**

Several authors mentioned many applications of using BPR. They shared the common idea that using BPR through the IT technology is the effective way to improve the supply chain management. Gorla, Chinta, and Chu (2007) advised that the increase in the use the IT leads to optimizing utilization in the company processes which enables BPR to improve supply chain management. Grover, Teng, and Fielder (1993) expressed that IT helps BPR project adjust business processes and improves the organization performance. Yin (2010) mentioned that the organization that uses IT to simplify work would create a strong network environment for the company which will result in increasing competitive advantages.

The application of BPR from several authors shows some similarities in the approaches. Yin (2010) has summarized the approaches as below:

#### **Step 1 Analyzing and discussing the process**

- a) Creating a Flow diagram of the existing process
  - Identified the Information flow, Product flow
  - Identified original functional organization structure

- b) Identifying problems within the existing process
  - Non-value-adding activities should be eliminated from the process and the remaining activities should be grouped to simplify the task and make it automated Peppard and Rowland (1995).
  - Seeking for waste and duplicated work that occurs in the process unit and outside the firm in terms of request for service. For example, Request for Quotation from suppliers may take 3 operation days.
- c) Identified the expected result from implement BPR

## **Step 2 BPR Implementation**

- a) Create Flow diagram for the new process
  - Change original functional structure into matrix structure
  - Conduct a cross-functional team based on the requirements and the objectives of the team
  - Utilize the IT by eliminating the paper work and shortening the coordination and communication process by using the automated process
- b) Interpreting of the new process
  - Translate the new process instructions and new standard procedures into document instructions. Each task must be stated in the instructions clearly together with advice about the automated signal.

## **Step 3 Verifying the reengineering concept**

- a) Evaluate the results
  - Comparing the before work flow after implementing BPR in terms of time, quality of the product (defect rate), cost and quantity of the product.

#### 2.2.4 Development of BPR model in SCM

In recent years ago, several BPR techniques have been developed. Two main types of BPR are discussed in this chapter, BPR Generic Model (Butler, 1994) and SCM BPR Model (Gorla et al., 2007). The comparison of these two models are shown in Table 2.1.

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**Table 2.1 Comparison Generic BPR and SCM BPR Model**

<b>BPR Generic Model</b>	<b>SCM-BPR Model</b>
Develop vision and objectives	Develop vision and conduct organizational analysis
	Appoint a change coordinator and set up a cross functional team
Identify existing process for redesign	Identify existing process for redesign
Understand and measure the existing process	Make As- Is process maps for three functional levels: <ul style="list-style-type: none"> <li>- Intra-functional processes</li> <li>- Inter-functional processes</li> <li>- Inter-organizational processes</li> </ul>
Identify IT tool and develop support solution for new process	Identify IT tool and develop support solution for new process
Test new process	Test new process
Make new process operational	Make new process operational
On going Continuous improvement	On going Continuous improvement

Source: Modified from Gorla et al. (2007), p.10

Butler (1994) purposed the “Generic BPR model” which the main emphasis on continuous improvement. The main characteristic of the generic BPR model is simplicity and ease of use. However, the shortcoming of Butler’s model is its lack of analysis on the internal processes and external factors. The first step of development consists of the vision, Butler’s model ignored the systematic and detailed analysis of

the customers' needs, organization, competitors and technological factors. Moreover, the participation of the user and IT support do not emphasize this model. The review of the process and the identification the adjustment of the BPR parameter is important.

SCM- BPR model (Gorla et al., 2007) emphasizes more on the creation of the cross functional teams to be responsible for the implementation of the BPR. The creation of existing process was emphasized at three levels which are Intra-functional, Inter-functional and Inter-organizational respectively. The IT support is efficient since the review and identification of the inadequacies of the original IT support is included in the development process. This leads to an efficient IT base solution to support the BPR implementation. Therefore, the SCM-BPR model will let the firm identify the root causes and develop the solutions more efficiently than the Butler's model.

To apply the SCM-BPR model, the following procedures should be followed, step by step:

**Step 1 Develop a vision and conduct an organization analysis**

- Setting targets through budgeting and benchmarking according to guidelines from top management. The analysis deals with organization units, functions, processes, data elements and environment to identify the key attributes of the organizational information system. **Suggestion tooling** includes Porter's model (Porter, 1980), Critical Success Factors, Value Chain Analysis, Strategic Orientation of Business Enterprise and Strategic Orientation of Information Systems (Kettinger et al., 1997)

**Step 2 Appoint a change coordinator**

- The change coordinator will help guide, implement, training the employee, promote the benefits and importance of implementing BPR, solve the problem and report the project status to the top management.



### **Step 3 Setup cross-functional teams**

- Cross functional teams will help smoothen the project for both inter and intra functional activities. Their task involves planning, coordinating, implementing and monitoring the overall BPR project.

### **Step 4 Make As-Is process maps (Intra / Inter-functional and Inter- organizational)**

- Creating a process map for these three functions will help the team members to understand and evaluate the existing processes.
- Intra-functional process: process within the functional areas
- Inter-functional process: process between the functional areas
- Inter-organizational process: process within the group of companies and with external entities, including upstream (inbound logistic) and downstream (outbound logistic)

**Suggestion tooling:** Data flow diagram, system/ process flow charts

### **Step 5 Identification of the process for redesign**

- Identify few core business processes that will have greater payback potential such as inefficient processes that cause data redundancy, re-entering of data and waste.

**Suggestion tooling:** Fishbone analysis,, Value analysis, activity based costing and quality function deployment

### **Step 6 Proposed new IT- based solution**

- Identify all possible IT enabled solutions and select the one that will best assist in achieving the desired vision on the step 1 goal.

### **Step 7 Implement new processes and trial run**

- Testing of BPR project will help minimize the possibility of failure and increase the learning experience in the firm. Once the results of the pilot run are acceptable, the project can run in the real environment.

**Suggestion tooling:** PERT, CPM, Gantt chart, PRINCE

## **Step 8 Ongoing continuous improvement**

- Provide long-term process management system to ensure that this change in the process will be continuously be improved and monitor.

## **2.3 Summary**

In conclusion, the technique of BPR has been reviewed because it is an effective way of restructuring the process to be more effective. If the BPR is implemented, It can have many benefits to the reprocessing of the process for the firm. Many authors advice that using BPR can generate proper communication, coordination and control of the process which results in improvement of productivity and quality of the product. Using BPR also helps the firm to save costs by reducing cycle time and inventory. Firms who seek for an improvement in efficiency on their performance can considered BPR as a helping tool.

BPR deals with analyzing, observing and changing the process of the firm by measuring the outcomes from the existing process and making a comparison after change process. The keys of BPR technique are to identify and eliminate all non-value added activities and shorten the process. The goal of the BPR is to simplified and integrated the task. Basically, the idea is to make the process sounded. IT is considered as main tool for implementing of BPR. By using IT, the transferring of the information for each process will have more visibility and transparency which in turn, results in better communication among each unit. Therefore, it is important for the firm to recognize their structure clearly.

This chapter has reviewed the benefits and the application of BPR technique which included the steps of implementing BPR. The activities focused have been stated and several academic papers and journal have been reviewed.

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

Research methodology is explained step by step in this chapter. The method of finding information about the existing process, the flow charts, how to implement BPR technique to the existing process and identification of the results after implementing BPR to the firm together with the interviews and its objectives are discuss below.

#### **3.1 Required Data**

Data required for this research covers both primary and secondary data. To identify the existing process flow and analyze the performance, required primary data includes the process activities, time consumed for each process, production lead time, and information and communication flow across departments. In addition, the secondary data includes the historical data i.e. sales records, inventory record, related expense, delivery reports, quality manual, and other related documents which are required.

#### **3.2 Data Collection\***

To ensure that primary and secondary data are reliable and valid, the triangulation technique is used. According to Yin (1996), sources of evidence for data collection are required as:

- Documentation reviews
- Archival Records
- In-depth Interviews
- Direct Observation
- Participant Observation
- Physical Artifacts

The techniques which are useful for interview are shown as below:

- establishing rapport
- keeping the discussion going
- avoid closed yes/no answers questions
- avoid jargon and abstractions
- avoid double negatives and loaded expressions
- avoid interruption and know how to use silences work for you
- avoid judgmental
- knowing how to focus and pace the interview

In this research, interviews were performed with two business owners and three managers from related departments which are the Logistic Manager, Production Director, and Sales and Marketing Director. The semi-structure interview was performed by asking open ended questions to the interviewee. Semi-structure interviews are a focus method that use only little guidance questions but is unrefined. The structure of questions ensure that the important topic areas are covered while room is given for flexibility to go deeper in certain areas (Robson, 1993; Fontana and Frey, 1994; Rubin and Rubin, 1995). The interview questions can be seen in appendix A. The objectives of the interviewing were:

- To understand the nature of the product, information and production process flow, working cooperation and working problem from the owner and the managers.
- To understand the strategy that the owner and managers use to handle logistic and other relate processes.
- To understand the problems of logistic in the controlling inventory issue.

The interview data were collected and analyzed by using Fishbone Diagram to find the problem and their root causes. Results of the Fishbone diagram are used to design the BPR to improve the process flow.

### **3.2.2 Direct observation**

The focus was on the department activities of each department and was conducted in order to identify the current process of each department such as details activities of the workers, process lead time the flow of information and product. The use of observation would gain greater significance and detailed information findings, which would be difficult to achieve with other methods (Henrik, 2007).

The researcher observes each department for five working days. The staff were not informed of this monitoring. The researcher randomly checked the status of order given in the production plan. At least 30 percent of total orders as average percentage of delayed orders were checked. The monitor will focus on the reaction time (collect by checking response time) and as the way the staff handles the instructions. The reaction time and the way the staff handles the instructions can be in verbal form, memos, emails or telephone calls. The main topic focus from direct observation are as below:

- How much time is spent on each normal working process (in day)?
- How much time is used to handle the new instructions (in day)?
- How the message or instructions are conveyed to the receiver?
- How many orders have problem or late deliveries?
- What is the main information that was focused in each department?
- What is the cause of the late deliveries problem?

Collection of the results, and the average of the result can identify actual performance of each department.

Data gathered from direct observation were used to draw the current process flow of XYZ while the total production and delivery lead time were emphasized. This information is used as a guideline for the BPR design.



### **3.2.3 Documentation reviews**

Data can be gathered directly from the past records of every department. Related historical data available in-house on various business processes and customer satisfaction-reports are also obtained.

The data required for this research are shown as below:

- Sales data (total sales, total order quantity, lead time)
- Inventory stocks (weekly stock and turnover)
- Delivery reports (on-time and late delivery report)
- Company customer satisfaction surveys (ten customers)

Data of 12 months obtained from January to December, 2011 are used in this research as this year occupied full production capacity. Compared to the year 2010, sales performance of the year 2011 increased more than 50 percent. Data are shown in Table 3.1 and Table 3.2.

**Table 3.1: Unit Produces Comparison in the Year 2010 and 2011**

Month	Monthly Production (Units)		Increase (percent)
	Year 2010	Year 2011	
January	100,000	210,000	110%
February	120,000	130,000	8%
March	250,000	260,000	4%
April	120,000	250,000	108%
May	130,000	210,000	62%
June	120,000	240,000	100%
July	170,000	210,000	24%
August	270,000	260,000	(-0.04%)
September	160,000	220,000	38%
October	180,000	280,000	56%
November	240,000	350,000	46%
December	160,000	230,000	44%
Total	2,020,000	2,850,000	41%

Source: Company data

**Table 3.2: Sales Comparison in the Year 2010 and 2011**

Month	Monthly Sales (USD)		Increase (percent)
	Year 2010	Year 2011	
January	2,210,000	4,370,000	97%
February	2,220,000	2,870,000	29%
March	5,230,000	5,940,000	14%
April	2,420,000	5,440,000	125%
May	2,670,000	5,320,000	99%
June	2,610,000	5,480,000	110%
July	3,520,000	4,960,000	41%
August	6,330,000	6,530,000	3%
September	3,090,000	4,930,000	60%
October	3,790,000	5,960,000	57%
November	4,890,000	9,130,000	87%
December	3,550,000	6,120,000	72%
Total	42,530,000	67,050,000	58%

Source: Company data

The data shown in the Table 3.1 and 3.2 are the sales in US dollars and production data in unit of cylinders from January to December of the year 2010 and 2011. The numbers are compared and the different in percentage between year 2010 and 2011 is reviewed.

Table 3.1 and 3.2 indicate that total sales and production increased more than 30 percent when compared to year 2010 and 2011. In 2011, there were many sales orders which caused difficulty for arranging the production schedule. The production schedules were changed many times during a month and this was not informed to logistic and sales. This miscommunication caused trouble for planning the delivery schedule for the logistic department. As a result, late delivery increased and customer satisfaction reduced. This increase of sales reduced the delivery performance of XYZ as shown in Table 3.3. Reduction of the customer satisfaction is shown in Table 3.4.

**Table 3.3: Late Delivery Comparison in the Year 2010 and 2011**

Month	Transactions (Times)					
	Year 2010			Year 2011		
	Total	Late	Percentage	Total	Late	Percentage
January	36	3	8%	52	10	19%
February	44	6	14%	45	8	17%
March	45	6	13%	68	25	37%
April	43	6	14%	65	22	34%
May	48	7	15%	58	18	31%
June	42	6	14%	55	18	33%
July	50	8	16%	58	18	31%
August	68	12	18%	60	20	33%
September	52	8	15%	64	17	27%
October	57	9	16%	67	19	28%
November	63	13	21%	65	22	34%
December	49	8	16%	65	18	28%
Total	597	92	15%	722	215	30%

Source: Company data

The data shown in Table 3.3 are the number of delivery reports from January to December of the year 2010 and 2011. The total orders and late deliveries are shown for each month and the percentage of late deliveries is also indicated. Then, the numbers are compared between year 2010 and 2011.

**Table 3.4: Comparison of Customer Satisfaction in the Year of 2010 and 2011**

Description	Satisfaction Score		Difference
	2010	2011	
Flexibility of Lead Time	4.00	3.09	-0.91
Punctuality of Goods Delivery	3.93	2.82	-1.11
Problem Solving after Goods Delivery	4.00	3.55	-0.45
Reliability of Service	4.53	3.45	-1.08
Forward of shipping document/certificate	4.4	3.27	-1.13

**Remarks:** Data from 10 random customers in each year with total score of 5

Source: Company data

The data shown in Table 3.4 are the average numbers from ten random customers according to the survey done in the year 2010 and 2011. These numbers were gathered from the XYZ database which conducts customer satisfaction surveys every quarter randomly for 10 customers. The total score is five and the description details are from the logistic part of the customer survey. As shown in Table 3.4, the score of customer satisfaction in each description reduced in year 2011 due to the problem of late delivery and impossibility of solving the problem for customers professionally.

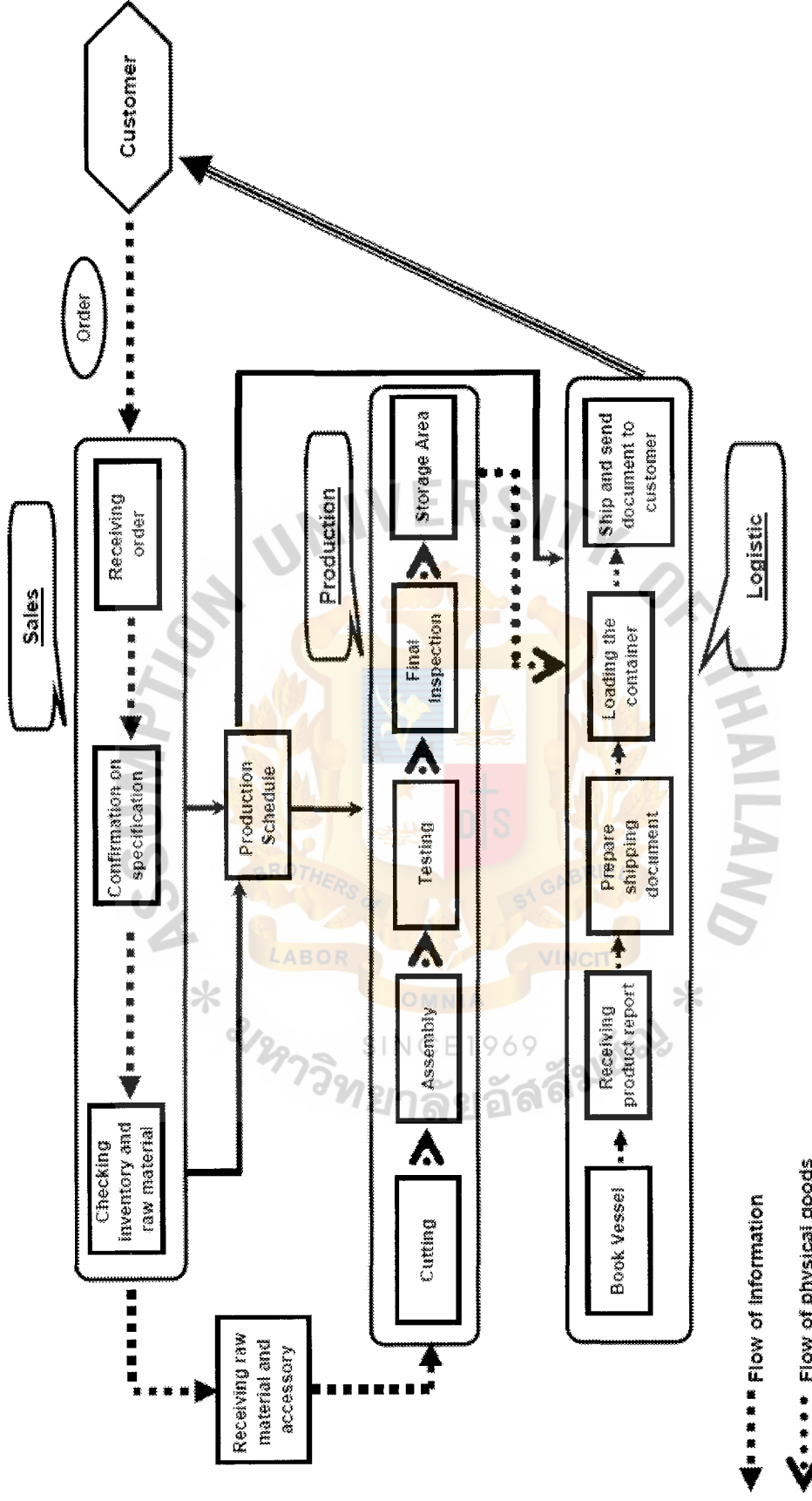
### 3.3 Identifying the Current Process Flow

The process flow identifies key activities from the starting point once the order is received until the delivery to the customer. It is crucial to identify the existing information, product and communication flow in order to understand the operational process of the firm. The depth detail of the process flow can detect and highlight the transaction and process problems. The identifying of the transaction and process problem are extremely important for implementing BPR project. To map the process from each department, document transactions, exchanges of information and production together with the observation of other relevant processes on other department processes would be performed. The current business process is shown in Figure 3.2.





Figure 3.2: Current Process Flow of XYZ



Source: XYZ current process flow

Figure 3.2 shows the current process of XYZ which starts from the order received from the customer. After the order is taken from the customer, the verification on the specification will be reviewed before confirming the production and delivery schedule. The production schedule is handed over to the logistic team for planning delivery activities. Then, the enquiry will be check for the raw material requirement. Once the material is received, the production will start the manufacturing process. The logistic department will start there process since the production schedule is confirmed at the beginning. The team will prepare and book the vessels in advance in order to make sure that when the product is finished, it can be shipped out without waiting. Then, the shipping document will be combined and sent to the customer.

### **3.4 Development of the BPR process**

The BPR process is developed based on the SCM-BPR techniques by Gorla et al. (2007) as described in chapter two. Details of each step are discussed as follows:

#### **Step 1 Vision and organization analysis**

Data gathered from the interview of the owners and managers and direct observation on the actual working process will be used to analyze the current organizational process. Information collected from the reviews of the related documents will also be used. Problems on communication process, flows of information within and between departments, and other related logistics problems will be identified. The possible cause of the problems will also be analyzed.

#### **Step 2 Appoint a change coordinator**

The meeting will be held among the managerial people to search for and appoint the leader of the BPR project. This leader will act as a change coordinator who coordinates each department and sets up the cross functional team. The roles, responsibility, and authorities of the project leader will be set in this meeting. The BPR related policy will be announced in the meeting.

### **Step 3 Setup a cross-functional team**

The BPR project leader will pick the crew from each department to form the cross functional team. This team will be responsible for planning, coordinating, implementing and monitoring the BPR project entirely.

### **Step 4 Make As-Is process maps**

The cross-functional team will elaborate the process map for Intra / Inter-functional and organizational in order to identify the flow of product, information and control information in details.

### **Step 5 Problem analysis**

The process will be review, monitor and identify the process that cause the major problems such as redundancy of the information and communication problem.

### **Step 6 Proposed the new working process as a To-Be process**

The working process will be redesigned. The focus will be on the current problems and their causes. The systematic communication system will be designed to promote the effective and efficient flow of the information. Information technology will be also integrated in the process.

The BPR project is expected to solve the problem by using BPR technique, for instance, the firm could change the communication process or conduct cross-functional teams among each department to increase the coordination performance.

The expected results focus on three activities, inventory turnover time, process lead time and delay problems per order. The inventory turnover starts counting from the date that productions is finished until all containers in the order have been loaded. The process time is measured based on actual performance in each department. The delayed problems are counted based on the agreement of delivery date by customers. The expected results will lead to the reduction of the penalty cost and reduction of process lead time. The increase performance of the communication flow will help increase the flexibility of handling and delivering products to customers. Thus, the

more effective inventory management, less internal process lead time and the penalty fee are expected after implementing the BPR project.

### 3.5 Summary

In conclusion, this chapter started with the research methodology and provides detail for each part. First, the collection of the data is separated in to 3 methods, in depth interviews, direct observations and documentary reviews. This research interviewed both of the two owners and three department managers in XYZ. The objectives of the interview is to find the actual process and problems of the current business process. Besides the interviews, direct observations on the real process is including in data collection to find the actual procedure and lead time of the process. Then, documentary review for the sales data, inventory data, and delivery reports and customer satisfaction will be gathered to monitor the performance of the logistic activities. Then, the current process mapping will be identified to show the flow of the information and physical products. Once current process is identified, the proposed BPR will be implement and measure the expected outcome of the current situation. Performance comparison will be done in reduction of the process lead time.

## **CHAPTER IV**

### **PRESENTATION AND CRITICAL DISCUSSION OF RESULTS**

The previous chapter indicated that, this research has adopted SCM-BPR concept to solve the problems of communication for the XYZ Company. The documentary data has been reviewed to support the problem and the current process flow has been conducted. In this chapter, the implementation of SCM-BPR will be applied to improve the process flow and solve the problems of XYZ. Before implementing SCM-BPR, the interviews have been conducted in order to interview the department managers of Company XYZ to understand the nature of the product and their recommendations with regard to this problem.

#### **4.1 Summary of the Data Collection Techniques**

In this research, interviews are divided into 2 parts. The first part is the business owner's interview and second is the department managers' interview. The interviews focus on the nature of the process flow and their opinion to the problems. The data gathered for the data collection were 30 percent out of total orders in a particular month of the XYZ Company. From the total orders, there were 65 orders. Thus, 30 percent or 20 orders were randomly selected. It was found that 11 orders have problems, 8 orders were considered late delivery and 3 orders were considered to have problems with long length of stay in the storage area. Thus, total orders which have problems are 11. The summarization of data collection techniques are discussed as follows.

Currently, there are four methods using in communication between each departments which are phones, paper/fax, e-mail and personal contact as shown in the table below.



**Table 4.1: Summary of Inter-departmental Communication**

<b>Departments</b>	<b>Phone</b>	<b>Paper/Fax</b>	<b>Email</b>	<b>Personal</b>
Sales Logistic	32	9	65	19
Logistic Production	41	29	63	13
Production Sales	41	13	56	23
<b>Total</b>	<b>114</b>	<b>51</b>	<b>184</b>	<b>55</b>
*Data were collect based on the overall number of times using in each method in each order. Total numbers of times are not reflecting any specific of general procedure or extra activities process.				

Source: Company data

Table 4.1 discusses the methods of communication among each department. Currently, from observation, there are four methods using in communication between each department which are phones, paper/fax, e-mail and personal contacts. The number collected in this table are the overall number of times in each method that occur in each order. Data were collected through history of e-mail account and number of paper/fax received.

Out of every department, the most popular method of communication is e-mail, followed by phone calls, respectively. E-mail is 50% more likely to be used compared to other techniques of communication.

#### **4.2 Key Findings of the Problem**

In order to understand the problems, the cause of the problems has been observed and summarized as below:

#### 4.2.1 Production and delivery lead time

In order to understand the production and delivery lead time, total of 20 random orders (the times consuming in general procedure from current process of XYZ) are averaged and summarized in Table 4.2.

**Table 4.2: Activities and Lead Time of Common Working Procedure**

Procedure		Description	Average Time (days)
General Procedure	Prepare Procedure	1 <sup>st</sup> Confirmation on specification (days)	2
		Checking inventory and raw material (days)	2
		1st Issue L/C (days)	13
		1st Issue production planning (days)	3
		Total prepare procedure (days)	20
	Production and Delivery Procedure	Production (days)	5
		Reservation booking (days)	3
		Product in storage area (days)	5
		Loading container (days)	2
		Total production and delivery procedure (days)	15
	Total General Procedure (days) = Total Prepare Procedure (days)+Total Production and Delivery Procedure (days)		35

Source: Company data

From Table 4.2, General Procedures of each order use an average of time of 35 days to complete the cycle. General procedures are separated into two procedures, preparation and production and delivery procedure. In preparation procedure, the process started with confirmation first of specification with customers and which uses an average of 2 days to complete. Next, the process of checking inventory and raw material uses average of 2 days for each order. Then, the next process is waiting for

the first issue of L/C. This process takes an average of 13 days. Finally, waiting time for the first issue of the production plan is averagely 3 days. From this preparation procedure process, the total average time used is 20 days. The second part is production and delivery procedures. It starts with the production period, and the average time using is 5 days. Reservation booking uses an average of 3 days. Then, the product shall be transferred to the storage area. The average length of the product stay in the storage area is 5 days. Lastly, length of loading containers takes an average of 2 days. In total, production and delivery procedure use 15 days on an average to complete all processes. However, Table 4.2 is count based on the real time used in the process by not including waiting or extra time. The extra activities in time and days are shown in Table 4.3.

**Table 4.3: Extra Activities and their Lead Time**

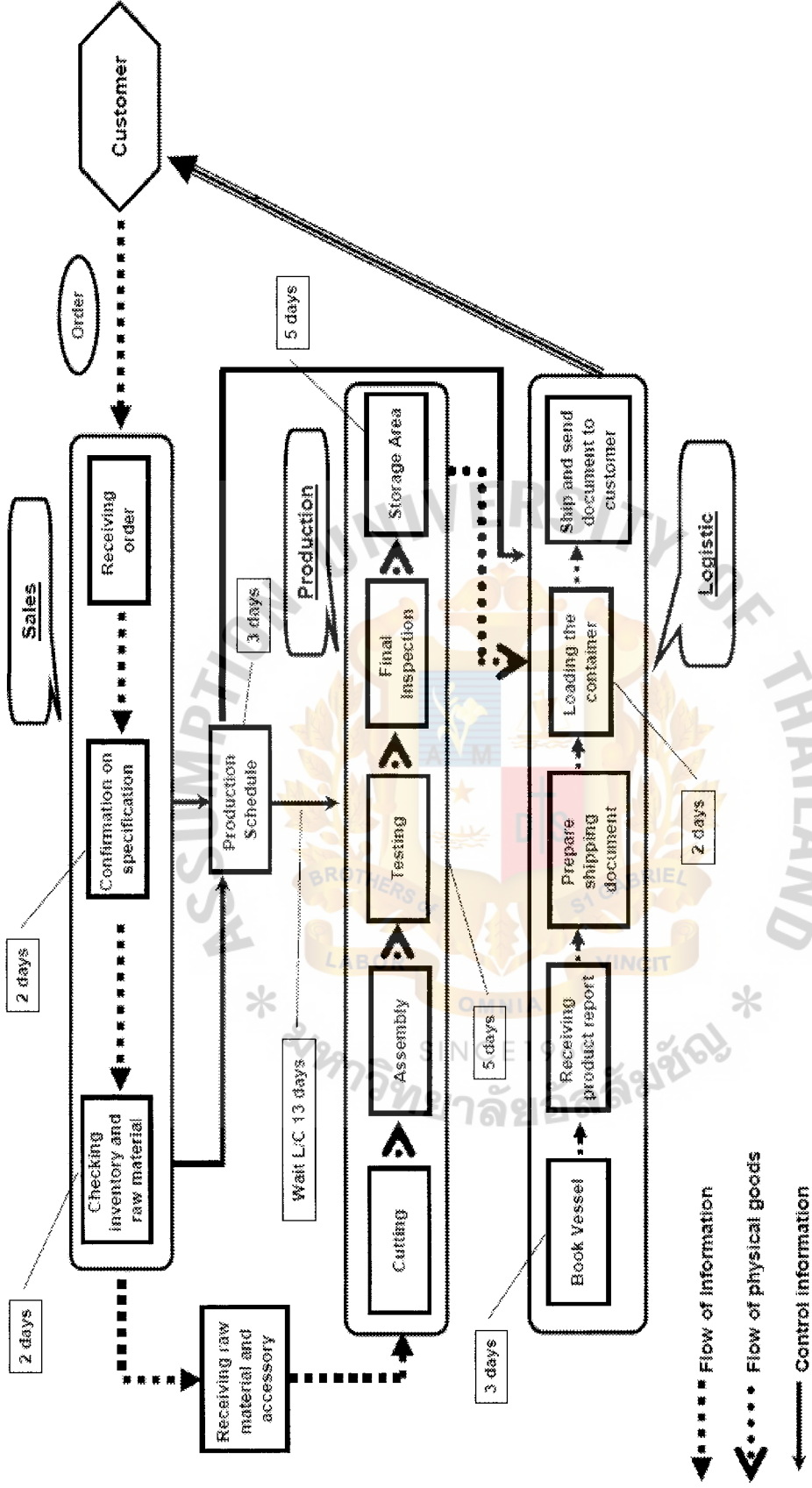
<b>Extra Activities (days per time)</b>		
Total revision on specification (average)	Total L/C amendment (average)	Revision on carrier booking (average)
4 days	11 days	3 days
*Average score are computed by using only order which has revision or amendment. Orders which have no revision or amendment in data are excluding in finding an average.		

Source: Company data

Table 4.3, indicate that the average scores are calculated from only the orders which have the revision or amendment in order to find the average lead time in each revision or amendment. Average score on revision of specification is 4 days per time. This means, if revision was made for 3 times, total days for revision will take 12 days. This also applies to average amendment of the L/C, 11 days, and average revision on carrier booking, which is 3 days. Thus, as much the revision or amendment is, as much time consumed for each particular order.

The current process flow of XYZ with the process lead time is shown in Figure 4.1.

Figure 4.1: Current Process Flow of XYZ (With Process Time)



Source: XYZ Current Process Flow

Figure 4.1 and 4.2 shows the current process flow of XYZ by including average process time gathered from direct observation. Total business process loop will be used approximately for 35 days.

The cause of the problem has been observed and summarized in Table 4.4, Table 4.5 and Table 4.6.

**Table 4.4: Problem from the Logistic Department**

<b>Problem from the Logistic Department</b>		
Unable to get carrier booking within time due to late update production schedule	Unable to load within time due late receiving the product from production	Production changed schedule without notice
5 times	1 time	6 times

Source: Company data

**Table 4.5: Problem from the Production Department**

<b>Problem from the Production Department</b>	
Less time to produce because of many revisions from sales	Less time to produce because of incomplete or late information from sales
3 times	2 times

Source: Company data

**Table 4.6: Problem from the Sales Department**

<b>Problem from the Sales Department</b>	
Unable to inform customer within time due to late logistic update	Unable to inform customer within time due to late update production schedule
2 times	6 times

Source: Company data

From Table 4.4 to 4.6, the most amount of problems occurred in the logistic department. The logistic department were unable to fix the schedule because



production schedules were frequently changed by the production department. This unreliable production schedule also effects late reservation of carriers which result in receiving the booking late or not in accordance with the time specified by production. Production claimed that the most important cause for frequently revising the production schedule were too many revisions from the sales team. Finally, the most problem for the sales team is that they are unable to advice customers to accept late production within customer's given time because of late updates of the production schedules.

Data required in each department share some common factors to each other. First, for sales and logistic, production schedule is the key to make any decision. The sales team need production schedules to advice customers above the delivery date and manage their sales plan. The logistic department use production schedules to reserve the vessel and arrange containers for loading. The focused data in production schedule are the production date and date of completion. Second, for production and logistic, L/C is required to planning their task. The production department needs L/C to know the deadline of the production. The logistic department needs L/C to plan the vessel and prepare shipping documents. The final information is reservation of the carriers or booking of the carriers for production and sales. The production department needs booking to know the date that the containers will arrive to the factory for loading. The sales department needs bookings to advice the customers of the delivery schedules.

#### ***4.2.2 Communication and information flow problems***

In order to understand the communication and information flow problems, the communication problems between departments were discussed and summarized as below:

##### **1) Communication problems between the Sales and Logistic departments**

Currently, sales and logistic departments communicate through all 4 channels. The most common channel used was phone and e-mail. Normally, when sales open sales

order to production to set the production schedule, the information of the completion date will be transferred to the logistic team by e-mail. Then, in the e-mail, sales will ask the logistic department to prepare the booking and container scheduling will be based on this information. However, the logistic department does not do the booking at the time of receiving the instructions. A booking is made only when sure that production will start. The booking received from carrier would be delayed. Generally, the average time for the booking reservations takes 3 days (process of checking for freight charge and send the booking request to the carrier takes 2 days and the booking confirmation takes 1 day). The carrier needs information of the desired date of trucking of the containers and the departure of the vessels to do booking. These data based on production schedule and L/C, respectively. In addition, booking of the in last minute are very risky because there is no space available. In this case, the vessel schedule has to be delayed to next vessel available. Once the carrier booking is postponed, the sales were late to request delay shipment for the customer.

## **2) Communication problems between Logistic and Production department**

In general, once the production schedule has been planned, production will update the completion date to logistic by e-mail. Then, before the production date, logistic will recheck with the production via phone to confirm the completion date and arrange containers for loading the goods. The problem occurs when the first committed completion date has been delayed or postponed without notice. In case of production delays, the logistic department need to cancel or amends the booking carrier. The worst case would occur if the container has already trucked as per the first committed schedule. In this case, the firm needs to pay extra rent fee and return empty containers.

## **3) Communication problems between Production and Sales department**

Once sales get the order from the customers, they will issue sales orders and pass it to production to plan the schedule by e-mail. The production schedule would need to run on first in first out basis. The sales teams need to advice the L/C date and complete

specification for the production department. The problem occurs when the sales make a reservation for the production. Usually, at the time sales make a reservation, the specification is not complete and it needs revising. However, sales usually ask production to plan their order and give a promise to finalize the specification before the production starts. In case that the sales were unable to complete the information within time, the production would need to be delayed or to be postponed accordingly. The process of complete specification takes an average of 4 days to perform but in case L/C needs to amend the process, it will take an average of another 13 days.

The conclusion of each department communication problems were shown as below.

**Table 4.7: Summary of Interdepartmental Communication Problems**

Departments	Flow of information problem	Process lead time	Information richness	Information Accuracy
Sales VS Logistic	Booking data from sales	3 days	Finish date, L/C date	Low
Logistic VS Production	Production schedule from production	3 days	Finish date, quantity per days	Low
Production VS Sales	Complete specification from sales	4 days	Type, drawing, quantity	Low

Source: The Author

Table 4.7 shows the flow of the information problem with process lead time, information richness and information accuracy. Between the sales and logistic department, the problems were concerned with booking data. Sales teams give a low accuracy of information in terms of the completion date to the logistic. In case the problem occurs, logistic need to take 3 days to revise the carrier booking. For logistic and production, the major problem is about the production schedule given by the production. The accuracy of the production schedule is low as they cannot commit to

the completion date and quantity per days to the logistic department. In addition, the lead time for creating the production schedule is an average of 3 days. Finally, the information of the specification given from the sales is not accurate. The specification needed by production is the type of the product, drawings and quantity needed. Sales uses an average of 4 days to complete the specification.

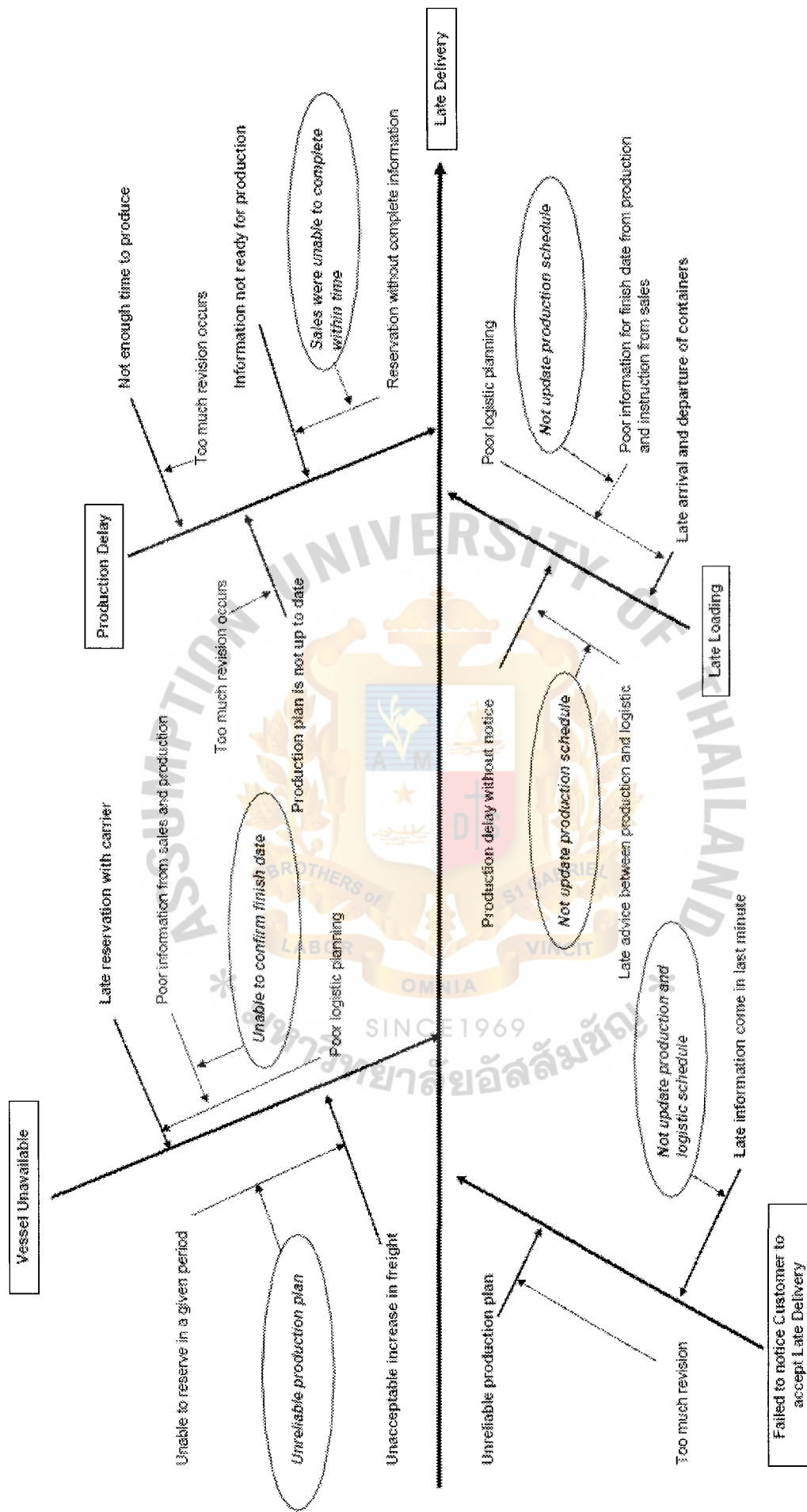
#### ***4.2.3 Other related problems***

Apart from the communication problems among departments, work flow is also obstructed by related problems. The first problem is the freight forwarder service. Freight forwarders usually give unreliable lead time for providing the booking. Especially for the last minute booking or revision, the booking provided will be very slow and face risk of vessel or container unavailability. The second problem was late loading due to production delay. The containers were unable to load within the closing time as the production finished late. The third problem was the inability to inform customers to accept delay within time. The fourth problem was the freight charge. Freight charge was one of the reasons for late booking. At the time that the sales order has been issued, the freight was fixed in a specific period. While logistic booking was last minute, freight charge was already invalid and, usually, increased. Thus, logistic needs to find other sources and discuss with sales to finalize the decisions which consume more time. The last problem is the human error. Human errors are often occurred when a problem occurred. Most common human errors were with instruction flow. This problem usually occurred by miss informing the change of instruction to other related departments and this resulted in miss communication.

#### ***4.2.4 Root causes of the problem***

In order to understand the root causes of the problem, a fishbone diagram technique is selected. The details are as follows:

Figure 4.2: Root Causes by Fishbone Diagram



Source: The Author



Late delivery as the major problem of this case resulted from four main reasons, production delay, late loading, vessel unavailability and failing to give notice to customers to accept late delivery. For the production delay, the main reason is the production lead time. The lead time for production is too short due to much revision requested from the sales team. Another issue is unavailability of information for production. This production plan is provided by the reservation department but the information for the sales team is incomplete. Second reason for late delivery is that, late loading occurs because of two main problems, like late arrivals and departures of the containers and production delays without notice. The third reason is the vessel unavailability which is caused from late reservation the carrier and unacceptable increase of the freight charge. Major causes of these problems were the unreliable production schedules. The last reason is failure to give notice to the customer to accept delayed delivery. This is considered being one of the most important issues. If sales can inform customers in time, the delay problem would be reduced. However, sales were unable to advice to customer as the information of delay occurs last minute.

The Fishbone analysis indicates that the major causes for late delivery are related intensely with communication between each department which is production, logistics and sales. This refers to late deliver of important information, unable to deliver important information and unable to deliver information to the correct person.

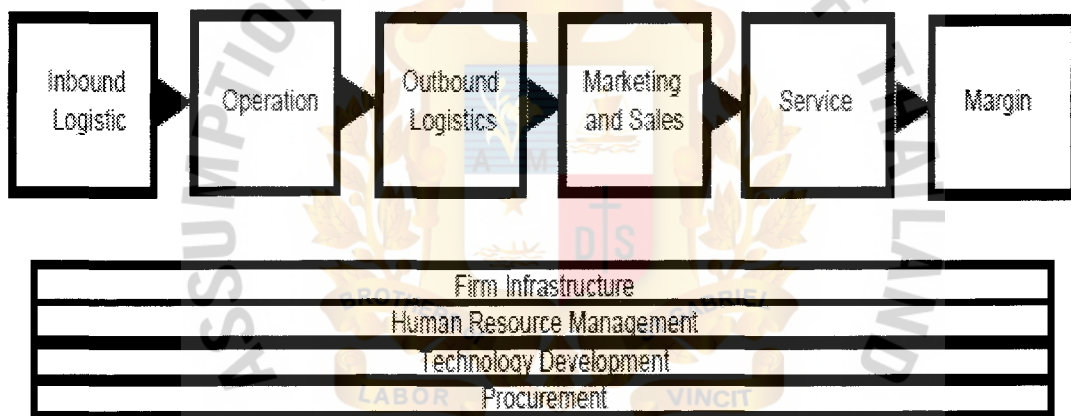
#### **4.3 Proposed SCM-BPR**

In order to solve the root causes of the problem identified in the fishbone diagram, the SCM-BPR technique is selected. Six steps of the SCM-BPR are designed. The details are as follows:

## Step 1 Vision and Organization Analysis

From interviews and direct observations results, the problem of XYZ Company focuses on communication problems between each department. The major causes were late information update on production schedule, L/C and reservation of the carrier which results in ineffective communication among each department. As the problem is regarding the information update, to improve the information flow, the organization structure is reviewed. Porter's model, Generic Value Chain were used to elaborate the organization structure.

**Figure 4.3 Porter's Generic Model**

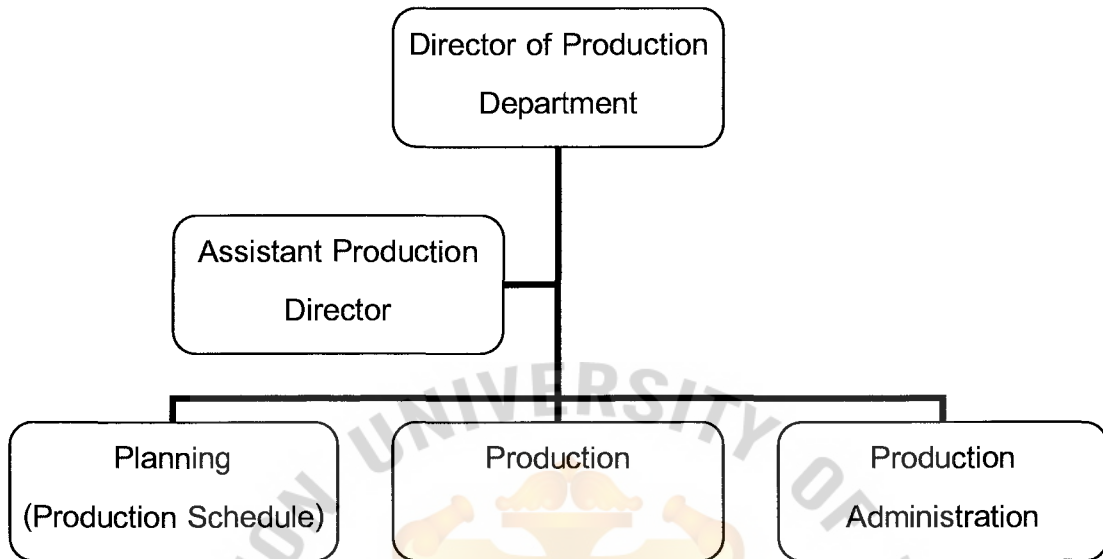


Source: McGregor (2007)

Porter's model expressed that value chain of the company consists of the value streaming from inbound logistic, operation, outbound logistics, marketing and sales and service to create margin. These activities are supported by the firms infrastructure, human resource management, technology development and procurement.

From Porter's model, the major concerns are in operation, outbound logistics and sales and marketing. This streaming are considered as primary core competencies of the XYZ firm. Each department organization structure shares similarity in pattern as shows in Figure 4.4, Figure 4.5 and Figure 4.6 respectively.

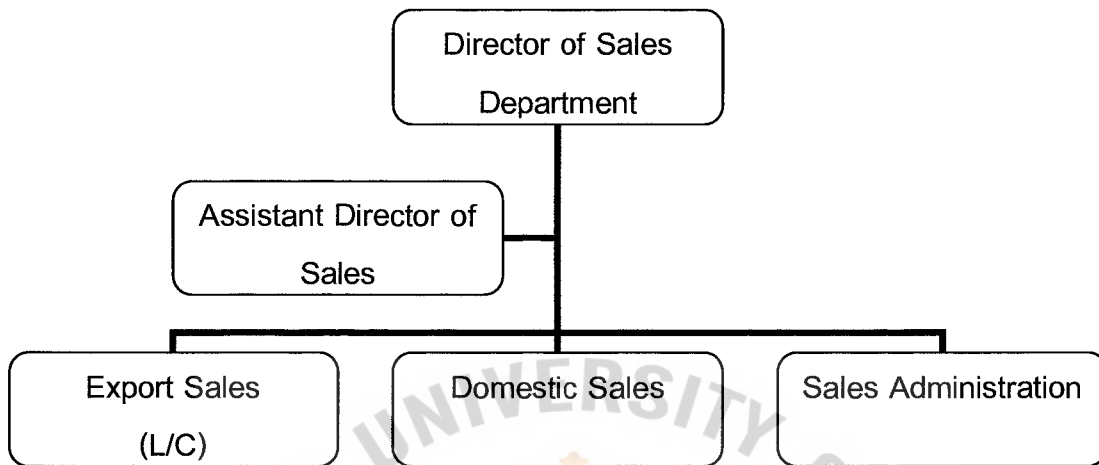
**Figure 4.4: Organization Chart of the Production Department**



Source: Company data

Figure 4.4, indicates that the production department has a director to lead and control all departments. The assistant director of production, mainly, makes reports and supports the control of the production department to director. Planning, production and administration are coordinated to contribute to the production plan and start production. Planning is whom people create and update the production. So, each time that production schedule has to be revised, the planning needs to be informed to adjust the plan. Production administration deals with production reports. In addition, the planning team needs to coordinate with the logistics and the sales teams in order to know the L/C and logistic information.

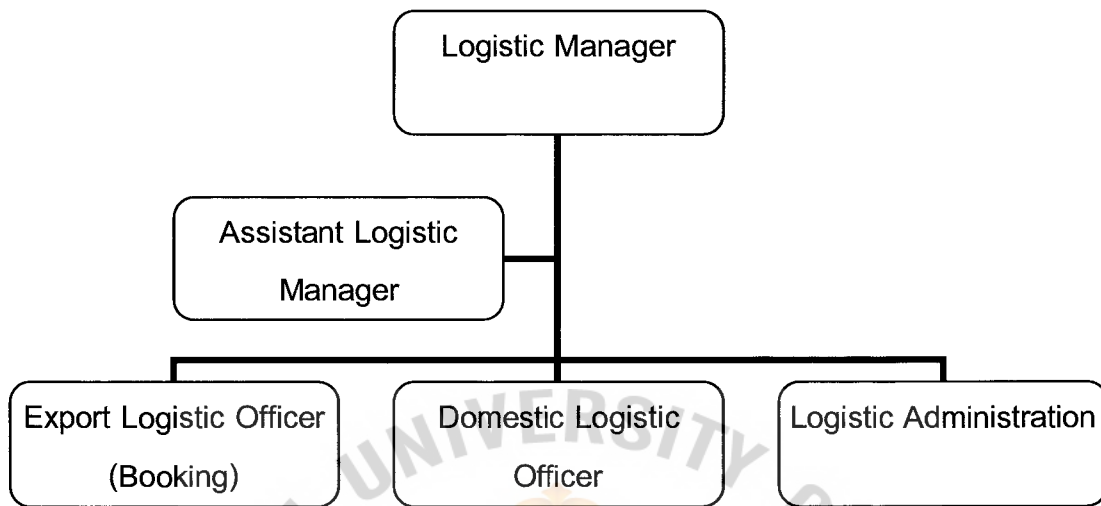
**Figure 4.5: Organization Chart of the Sales Department**



Source: Company data

Figure 4.5, indicates that just like the production department, the director of sales have to lead and control the department. Assistants make reports and support the director. The sales teams consists of export sales, domestic sales and sales administration. Export sales and domestic sales are totally separate in the working function. Export sales coordinate directly with production and planning for revision and advising PO. Sales administration does sales reports. Export sales have the information of L/C and coordinate directly with the planning and logistic officers.

**Figure 4.6: Organization Chart of the Logistics Department**



Source: Company data

Figure 4.6, indicates that the logistic department has a logistic manager to control and monitor the department. The assistant manager supports the loading task and makes reports to the manager. Logistic has the same structure as the sales teams and separate teams into export logistic officer, domestic logistic officer and logistic administration. The export logistic officer has to inform about of the booking and receive the information of production and L/C from planning at the production and sales, respectively. Similar to other department, the logistic administration does reports of the logistic activities only.

The connection among these three departments is by phone, paper/fax and e-mail. The working procedures for handling the orders is well written and implemented. However, the working procedure between these departments for connection with each other is formal only for the first time when the fresh instruction has been given. If there were interruption or intervention after that, the process of cooperation is not clear. This problem often reflects in miss communication to other departments or late information.



## Step 2 A Change Coordinator

Change coordinator duties are concerned with coordination of activities of the BPR in cross-functional teams. Thus, the person who leads this BPR project needs to hold the key information that effects other department tasks. From the interview and direct observation, the key information that was crucial to all decision was the production schedule. Thus, the proposed change coordinator for this project would be **“Assistant production director”**. The reasons for selecting the assistant production director as a change coordinator are as below:

- 1) High knowledge of production nature such as production schedules and production lead time
- 2) High seniority, expertise, respect and experience in the company
- 3) Understands the nature of each department requirement and work functions

As the general processes are complied according to the customer requirement (30 days delivery after receive L/C), the main objective of this BPR project will focus on **“Reduction of the late delivery to 5% of total orders and length of product stay in storage area to less than 5 days within year 2012”**.

## Step 3 Cross-Functional Team – Coordination Team

As instructed by management of the firm, one of the factor request is implementation of the project with less cost as possible. Thus, the coordination team will select from the current staff within the departments. The person who takes this position would have to have skills of using a computer to update information and know the business structure of their own department quite well. Thus, proposed coordination teams are **“Administrators”** of each department. The reasons for selecting administrators in cross-functional team are as below:

- 1) Able to use the computer to update information, as their main task is doing reports and updating information
- 2) Each administrator has knowledge about their department
- 3) No workload problems

The creation of the coordination team request no investment as their workload can still increasing handle the new tasks. The proposed reward for this duty should be considered by performance evaluation and bonus in the end of the year.

#### **Step 4 Make As-Is Process Maps**

The analysis of current process flow shows that the problems among each department occurs from being unable to communicate or update information within time. As the process of each department shows some sharing in information needs, each departments' information will effect the other departments planning. As a result, inability to communicate or update information within time would lead to unreliable planning in each department. Thus, intra-functional, inter-functional and inter-organizational structures / processes shall be reviewed in order to understand the information requirement and its output from each department.

##### ***Intra-Functional Process***

The interview and direct observation results, indicate that the problem in communication flow point to the production schedules, thus the Intra-functional process that effects the production schedule creation and adjustment shall be reviewed.

**Table 4.8: Intra-Functional Processes in XYZ Sales, Production and Logistics**

Department	Process Description	Input	Output	Communication mode	Existing I.T. support
Sales	Checking raw material and inventory	Customer specification	Issue Sales order to production	By phone, email or personal	Email: MS outlook, MS Excel (sales file)
Production	Creation of production schedule	Sales order	Send production schedule to sales and logistic	By email	Email: MS outlook, MS Excel (production file)
Logistic	Reservation carrier	Sales order and production schedule	Inform delivery schedule to sales	By phone, email, paper or personal	Email: MS outlook, MS Excel (logistic file)

Source: Company data

From Table 4.8, it is evident that most of the existing processes are handled manually. Data has to resubmitted many times to different process and departments. For example, sales order needs to advice the production and logistics and data need to key in different formats of excel file. Each department has their own format for keeping the sales, production and logistic data. This re-entering of data causes inconsistency and inaccuracy in outcomes in addition to manual checking and unnecessary workload in the process.

### ***Inter-Functional Process***

In XYZ, there are three major departments that work closely with each other which are sales, production and logistics. However, each department work is based on their format and the communication between systems has no integrity and are transparent. For example, all the communication over IT is conduct through e-mail. XYZ has invested SAP systems in order to centralize the information between each department.

However, due to lack of computer skills, the SAP systems are used only within the department for their own specific task such as checking raw materials. The main user of SAP in XYZ is in the finance and account departments.

**Table 4.9: Inter-Functional Processes in XYZ Sales, Production and Logistics**

Department	Input	Output	Communication mode	Existing I.T. support
Sales	Specification form	Sales order	By phone, email or personal	Email: MS Outlook, MS Word (sales file)
Production	Sales order	Production schedule	By phone, email or personal	Email: MS Outlook, MS Excel (production file)
Logistic	Production schedule	Delivery Schedule	By phone, email, paper or personal	Email: MS Outlook, MS Excel (logistic file)

Source: Company data

Table 4.9, indicates that the communication between each of the three departments is conducted in the same way which is by phone, e-mail or personally. However, the format of communication in excel are different.

#### ***Inter-Organizational Process***

The process that links external suppliers and customer of XYZ are shown in Table 4.10. The current information exchange with suppliers and customers such as delivery booking reservation, purchase order, specification and delivery schedule are all conducted in the form of e-mail and phone. The existing IT system at XYZ was unable to connect to these suppliers and customers.

**Table 4.10: Inter-Organizational Processes**

Entity	Input	Output	Communication mode	Existing I.T. support
Freight Suppliers	Purchasing order, Invoice	Booking reservation, payment	By phone, email, paper	Email: MS Outlook
Customers	Inquires, Customer orders	Reply for inquires, delivery schedule	By phone or email	Email: MS Outlook

Source: Company data

Table 4.10, indicates that the communication through suppliers and customers are normally done by using e-mail. Especially, if the customers' location is overseas, the company uses only phone or email to support communication. Communication to suppliers and Freight forwarders, is usually done by e-mail, phone and paper. In addition, the most common communication tools to connect with suppliers are also by phone and e-mail just like for other customers.

### **Goal Setting**

After reviewing the intra-functional, inter-functional, and inter-organizational processes of XYZ, the existing performance indicator and BPR benchmarks are set as a goal for process improvement. From XYZ data, it is found that these processes are not meeting the KPI of the company. Thus, the benchmark in this goal setting shall use general KPI from XYZ data. As from the interviews and direct observation, the problem occurs in the communication process between three departments, thus, only intra-functional and inter-functional will be chosen for comparing performance with BPR benchmarks.



**Table 4.11: Comparison of XYZ's performance with BPR Benchmarks**

<b>Process / Departments / Entities</b>	<b>Existing Performance (average)</b>	<b>BPR Benchmark</b>
<i><b>Intra-functional process</b></i>		
Checking raw material and inventory	2 days	1 days
Creation of production schedule	3 days	1 days
Reservation carrier	3 days	2 days
<i><b>Inter-functional process</b></i>		
Sales	4 days	2 days
Production	3 days	1 days
Logistic	3 days	2 days

Source: Company data

Table 4.11 describes the existing performance in average for intra-functional and inter-functional process with the comparison of BPR benchmark (KPI) of XYZ in each process. As mentioned above, inter-organizational process is excluded in this table because the main focus of the problem is within the company.

### **Step 5 Problem Analysis**

Problem analysis is based on the situational factors recognized by the team members. The major emphasis would be the problem of the communication flow between each department. From intra-functional and inter-functional processes, the instruction communication was duplicating the data in different formats from each department manually. The communication between each department was used, mainly, on email and phone basis. This results in slow response and increased lead time for the process. The current information systems currently used by each department lacked integration which resulted in data inconsistency and inaccuracy. This manual separation of input causes the problem of miscommunication and slow response and updating information among each department becomes a problem.

## **Step 6 Proposed the New Working Process as a To-Be Process**

From problem analysis, the proposed BPR concepts are to set up coordination teams from each department to represent monitor and update the production schedules. The communication process between each department would need to pass to the coordination team. The proposed adjustments are as below.

<b>Team leader:</b>	<b>Assistant production director</b>
<b>Responsibilities:</b>	<ol style="list-style-type: none"><li>1) Control and monitor coordination team members</li><li>2) Gathering information directly and only from coordination team and propose production planning for adjustment</li><li>3) Coordinate directly with production planning</li><li>4) Conduct meeting of the coordination team every week</li><li>5) Solve dispute among each of the three departments on production schedules</li><li>6) Update production schedules on the server every evening</li><li>7) No direct contact with other parties from different departments</li><li>8) Report directly to the production director</li></ol>
<b>Tools:</b>	* MS Excel, MS Outlook, Share drive *
<b>Key information:</b>	<b>Sales order, Description/Customer, Order quantities, Produced quantities, Left quantities, Payment terms, Completion date, Latest date of shipment from L/C, Carrier booking closing time, Carrier booking departure date, Status of the shipment, Latest update, Progress details and responsible departments, Pending information / instructions and responsible departments.</b>

**Crew # 1:**

**Sales administrator**

**Responsibilities:**

- 1) Gathering sales orders and L/C data from the sales members
- 2) Directly submitting data via e-mail to team leaders every half day
- 3) A copy to the sales director and sales team when submitting data
- 4) No direct contact with other parties from different departments
- 5) Report directly to the team leader

**Tools:**

MS Excel, MS outlook

**Key information:**

**Sales order, Description / Customer, Order quantities, Payment terms, Latest date shipment from L/C, Status of the shipment, Status of drawing and L/C, Status of customer acceptance to the delivery period, Sales progress details and Pending information / instructions**

**Crew # 2:**

**Production administrator**

**Responsibilities:**

- 1) Gathering production data from the factory
- 2) Directly submitting data via e-mail to team leaders every half day
- 3) A copy to the production director and production planning when submitting data
- 4) No direct contact with other parties from different departments
- 5) Report directly the team leader

**Tools:**

MS Excel, MS outlook

**Key information:**

**Sales order, Order quantities, Production schedule in days for 4 weeks**

**Crew # 3:** **Logistic administrator**

**Responsibilities:**

- 1) Gathering logistic data which is booking details
- 2) Directly submitting data via e-mail to the team leader every half day
- 3) A copy to the logistic manager, sales director and sales team when submitting data
- 4) Report directly to the team leader

**Tools:** MS Excel, MS outlook

**Key information:** **Sales order, Order quantities, Latest date of shipment from L/C, Status of the shipment, Carrier booking closing time, Carrier booking departure, Container pick up date, Container return date, Status of customer acceptance to the delivery period, Logistic progress detail, Pending information / instructions**

#### ***Method of Communication***

The main method of communication is via e-mail. The support communication is shared on the server of the company's intranet. The shared server will be used to place the updated production schedule which three departments can access freely. However, the update production plan is in the read-only file and cannot be fixed over the server. The only authorized person who can update and change the planning are the team leader of the coordination teams. In addition, all instructions and updates must be in e-mail format only and must be kept as evidence for at least 6 months. Each of the instructions that pass from each department staff to the coordination team, and from coordination team to team leader, must be in e-mail format only. The other communication method such as phone, paper/fax and personal are not allowed for instructing or updating.

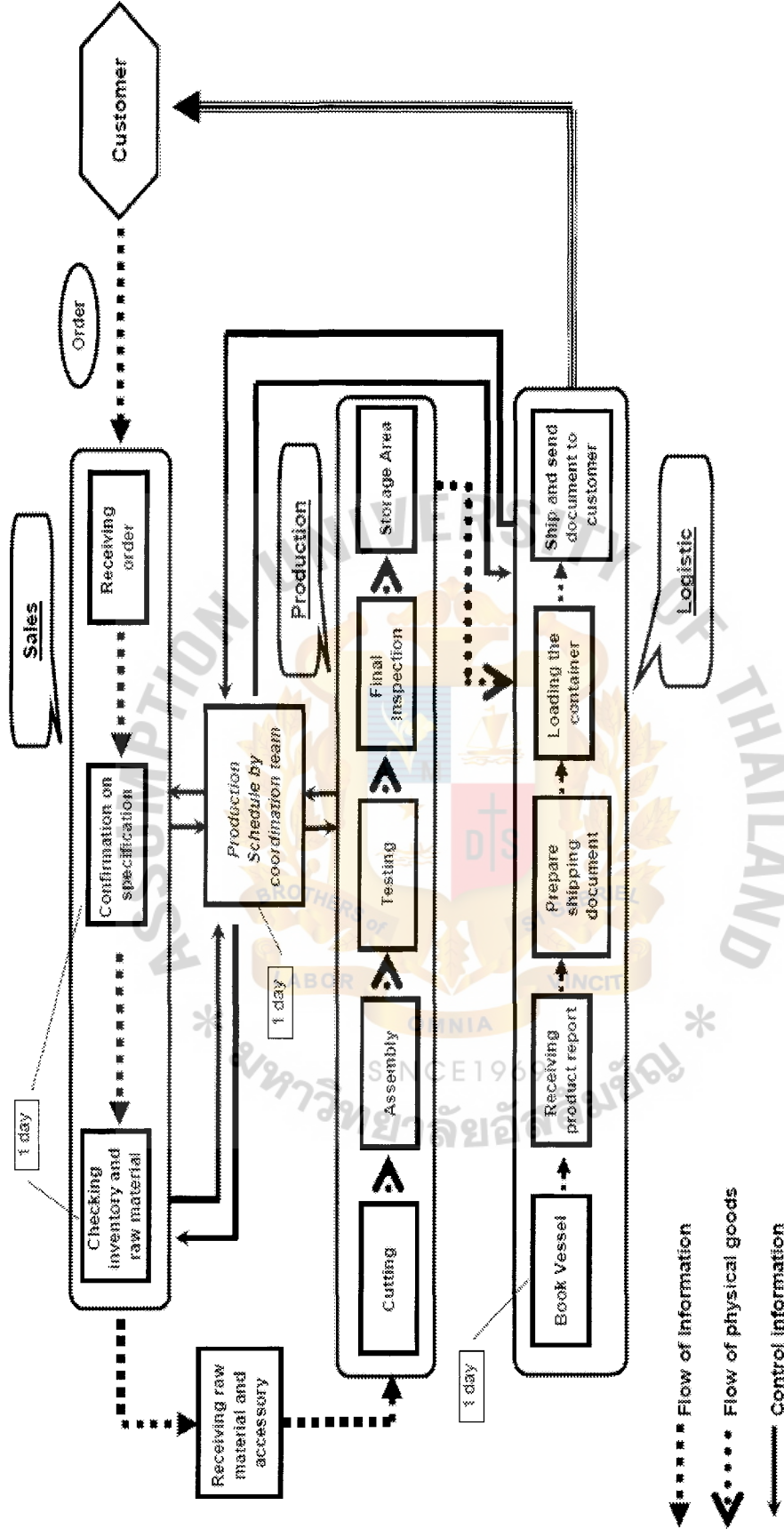
### ***Proposed Communication Flow***

The problems of the communication flow occurs from the inaccuracy of the data which increases the unnecessary lead time in the process flow. This inaccuracy of data also effects the reliability of the production schedule. Thus, the proposed communication is aiming to solve the problem of inaccuracy data, reduce lead time of the process and increase the reliability of the production schedule.

From the communication problems among three departments, problems are identified in the three main communication flows. First is the carrier booking data from the sales to the logistics, the main information of the completion of production date and last, the shipment departure date from the L/C are identified on. The revision of the booking takes 3 days on average if the information is inaccurate. Second, the production schedule from the production with the main information requires the completion date of production and quantities that are produced. The revision of the production would take 3 days on an average if the information is interrupted or re-instructed from sales, such as re-specification. Lastly, the specification from sales, the main information such as drawing and quantities were needed to complete the specification of production. The revision of each specification takes an average of 4 days to complete if the information is inaccurate. Thus, to reduce these revision problems, the increase of information accuracy and reduction of lead time is considered. The proposed communication flow for XYZ is discussed as below Figure 4.7.



Figure 4.7: Proposed Process Flow of XYZ

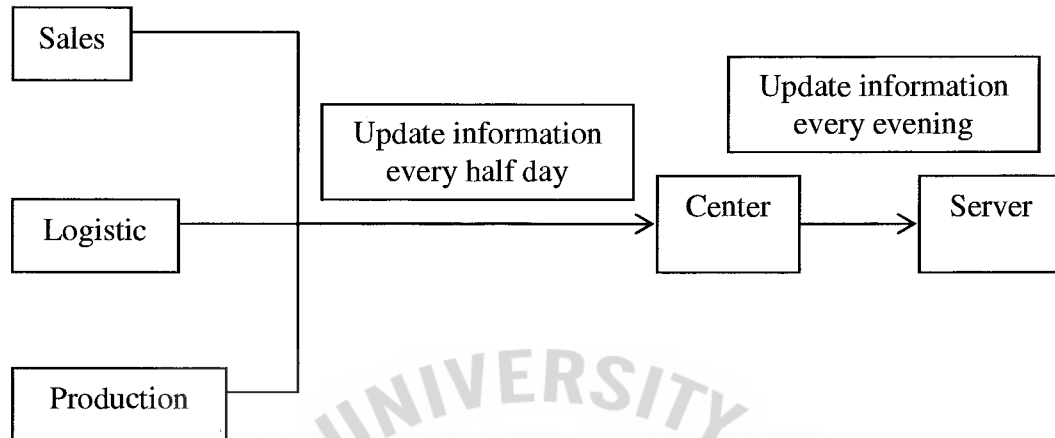


Source: XYZ Proposed process flow

Figure 4.7 shows the proposed process flow for XYZ. From the current process flow of XYZ, the control information is concerned with production schedule from planning. The communication will pass in one direction to the other departments. The current process of XYZ causes problems when the communication is interrupted by any department after the first order has been instructed. Once the order has been reinstructed, usually, lack of communication such as miscommunication and slow response between each department occurs. This problem usually results in unreliable production schedules. From the above mentioned, one of the key is accuracy of the information, especially in production schedule. Thus, the focus of this proposed BPR is aimed at improving the production schedule reliability. The proposed Figure 4.8 shows the change of the production schedules issued and controlled by the coordination team. Each department will have coordination team working as the middle man. The team will transfer all data to the coordination team center which is located at production department. From this figure, the communication is in two directions. Thus, the adjustment of the instruction and updating of the production schedules are controlled and monitored closely. Thus, the problem of miscommunication between each department would be reduced.

The proposed process shall apply the center excel format for updating the production, order details and order progress. This leads to increase of information accuracy and shortening of the process flow lead time. Each department would need to update their own format and submit it to the center at production. Then, the center will update the information on the center excel format. These three departments can see the center excel file in the share drive. To elaborate the picture, the updated information and the procedure is shown in Figure 4.8 on the next page.

**Figure 4.8: Proposed New Procedure**



Source: The Author

Figure 4.8, indicates that the information from each department is updated to the center every half day. Then, the center combines data and updates information every evening and places it on the server. This new procedure increases the accuracy of the data as the information is frequently updated and combined together in center. Thus, the problem of inaccuracy of the information between departments could reduce. With this new procedure, the lead time used for updating the information will be only one day. The improvement of accuracy of the data with less lead time enables each department to work smoothly. Production would recognize and have better planning as the movement of the specification from sales is known. In addition, the early production booking without complete specification from sales are prohibited. Sales must complete all the information, then, allow issuing sales order. Logistics will have sufficient time and accuracy date of booking details for arranging the reservation with the carrier. Sales will able to advice the finish and delivery date to customers with more accuracy. As the excel file would be updated on a daily basis, the production schedule are close to real time. Together with complete information from sales, the problem of inaccuracy information would be reduced. Thus, the completion date have more visibility and reliability. If the delay occurs, each department will know in advance and be able to adjust their plan accordingly. More importantly, duplication of work were be deleted as only the center updates the excel file.

### ***Expected Results***

The outcome of BPR implement would be the improvement of the communication process among sales, production and the logistic departments. The improvement results would emphasize on reduction of lead time to accomplish company KPI. More importantly, the delay of the shipment and inventory problem is expected to reduce as per company KPI. From KPI, delay shipment must not exceed 5% of total orders and inventory stocks must stay in the storage for less than 5 days. The purpose of the results are shown as below in Table 4.12.

**Table 4.12: Comparison of the Expected Result and the Benchmark**

Process / Departments / Entities	Existing Performance (average)	Proposed Performance	BPR Benchmark	Reason
Intra-functional process				Reduce communication lead time and reduce duplication of excel file among each department by using share drive and update daily
Checking raw material and inventory	2 days	> 1 day	1 days	
Creation of production schedule	3 days	1 days	1 days	
Reservation carrier	3 days	1 days	2 days	
Inter-functional process				
Sales	4 days	> 1 day	2 days	
Production	3 days	1 day	1 days	
Logistic	3 days	1 days	2 days	
Flow of information problem				
Booking data	3 days	1 day	1 days	
Production schedule	3 days	1 day	1 days	
Complete specification	4 days	>1 day	1 days	

Source: Company data

Table 4.12, describes the comparison between current, proposed and benchmark lead time of each process. The proposed lead time for each activity is proposed at one or less than one day. As the main information is updated on a daily basis to the share drive, the information accuracy and reliability are close to real time. Thus, by communicating through a single center, the lead time of each process will be reduced to one or less than one day. Compared to the benchmark (XYZ KPI), this proposed BPR would generate better results than benchmarking. The proposed BPR would reduce the communication lead time and reduce duplication of excel file among each department by using share drive and updating information daily. The lead time of reserving carrier booking is reduced as the information accuracy enables advance booking. The benefits of increase accuracy of the data and daily updates would also reduce the problem of product staying for long periods in the storage area. As logistics have more accuracy data to book the vessel, the booking from carrier can be done in advance. Thus, the containers would arrive to factory very close to the completion date to reduce the period of product staying in the storage area.

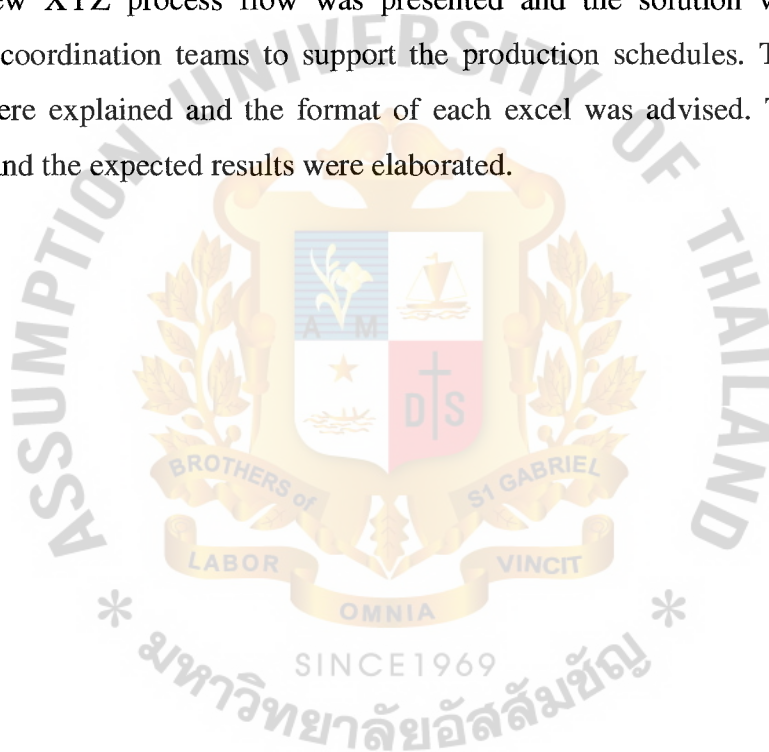
Even though the new BPR is implemented, it would take some times to monitor the results. As such, only expected results are presented here.

#### **4.4 Summary**

This chapter discussed about how to implement BPR. In order to understand the nature of the process and problems that occur, data collection as performed. The results are verified by using the fishbone diagram in order to find root cause of the problem. Data collection techniques are also conducted to understand the actual process and lead time of the process. The random of 20 orders were selected from the total orders and monitored closely. Out of 20 orders, 11 orders found to have problems with delay and long inventory stay over at the storage area. The results showed that the average lead time for total process was 35 days and the most common method used for communication was e-mail and phone. The cause of the problems in 11 orders was verified and concluded. Then, BPR development was implemented to solve the problem. Starting with organization analysis, the Porter's generic model was



used to analyze the company's supply chain streaming. Then, the organization structure in each department was reviewed. After that, a change coordinator, assistant production director, were set up based on their expertise and seniority. Then, the coordination teams, administrator from each department, was selected to work jointly in this project. Once the coordination team were set, the make of as-is process was discussed. The intra-functional, inter-functional and inter-organizational of XYZ were discussed to find each process lead time and other details. Then, the goal was set to reduce the process lead time by setting benchmarks from XYZ's KPI. Finally, proposed new XYZ process flow was presented and the solution was given by introducing coordination teams to support the production schedules. The details of each title were explained and the format of each excel was advised. The proposed procedures and the expected results were elaborated.



## **CHAPTER V**

### **SUMMARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

The discussion of the summary findings, conclusions and the recommendations of this research are presented in this chapter.

#### **5.1 Summary of the Findings**

The reason for conducting this research is the benefits of the improvement of communication flow which can help to reduce the delay and inventory problems. The BPR is an easy tool that can be implemented in the short term.

Company XYZ is one of the companies that faced the problem of delay delivery and inventory. These problems create the research question which is “*How could the BPR solve communication/information flow problems among departments in XYZ?*” Thus, the important objective of this research is to find the appropriate communication process to improve the business process of Company XYZ.

From the previous chapter, the root cause of delay delivery and inventory problems occurred because of the problem on communication flow among each department. The causes of late delivery are described as below:

##### **1) Production delay**

The cause of production delay resulted from the inability to produce according to the plan as there were too many revisions on specifications from the sales.

##### **2) Late loading**

Logistics are unable to manage the logistic plan accurately enough and arrange the booking with carrier. The main problem is unreliable

production schedule from production. Thus, containers arrive late and lead to inability to load within the closing time.

### **3) Vessel unavailability**

From the unreliable production schedule, logistics are unable to arrange the booking in advance. Thus, last minute booking usually occurred. The risk of vessel unavailability is faced.

### **4) Failed to notice customer to accept late delivery**

With unreliable and late update of production schedule, sales are unable to advice customers to accept late deliveries. Since the information of late delivery occurred in last minute, customers are not able to accept late deliveries.

The above mentioned information, problems of late delivery are divide into 4 parts. The major concern is production schedule. Since the production schedules is the key to conduct the plan in each department. In order to solve the accuracy of the production schedule and reduce lead time of the process, the BPR technique was applied and summarized as below:

#### **1) Delay Problems**

Problems of delay could be reduced if the production plan is reliable and updated. The customer, normally, accepts delay if they have been informed in advance. The reliable and updated production schedule would support the sales team to inform customers regarding delay within time. Logistic performance on the inventory management would increase if the production schedule is updated. Logistics could reduce the inventory turnover time in storage area by increase accuracy on reservation on the booking with carrier.

#### **2) Communication and information flow problem**

Among each department, information sharing is needed. Information such as L/C data, production detail and sales order are shared among each department. While the data is shared similarity, each department uses

different formats to input the data. Thus, the communications between each department are duplicated. Moreover, the instruction that passes from each department to another has no fix schedule and is not complete. Problems of information accuracy occur and lead to unreliable planning for every department. Together with long lead time in each process, the problem of late delivery is occurs.

### **3) Proposed SCM-BPR**

Six's step of SCM-BPR technique were applied to solve the problem. The analysis shows that the organization structure of each department share similarity in formation. Thus, the change coordinator and implementation of a coordination team are proposed. The coordination teams are set up by using the original resource (staff) in the company. The responsibility is to centralize the information from each department and update on the intranet server. Thus, each department will see the same information. The data that is updated every day focus on sharing information which is L/C details, order details, production details and logistic details. In addition, the schedules of updating are fixed on a daily basis. Thus, the information updates daily are close to real time with high accuracy. The reduction of duplication work and close to real time environment reduces the lead time in each process. The proposed BPR process would help XYZ reduce the lead time of each process to one or less than one day. Comparing to internal KPI of XYZ, the proposed BPR process is better than KPI. Once the accuracy of information is improved, the logistic activity will be performed smoothly and be able to book in advance. Thus, the problem of long inventory turnover shall be reduced accordingly. Summarizations of the improvement are shown as below in Table 5.1.

**Table 5.1: Comparison Result of Current Process and Proposed BPR Process**

Description	Current process	Proposed BPR process	Improvement
Prepare procedure lead time (exclude waiting L/C time 13 days)	7 days	2 days	<i>5 days</i>
Reservation carrier lead time	3 days	1 days	<i>2 days</i>
<b>Total lead time</b>	10 days	3 days	<i>7 days</i>
Information accuracy	Low	<i>High</i>	
Information update	Not fix	<i>Daily basis</i>	

Source: The Author

Table 5.1, indicates that the lead time of current process and proposed BPR process are compared. The result shows the improvement of proposed BPR process from total 10 days lead time to 3 days. The improvement lead time are 7 days and are counted as 70% improvement. In addition, the information accuracy is also increased and the information is updated on a daily basis.

## 5.2 Conclusions

This study used SCM-BPR to improve the communication process. The problem was analyzed while SCM-BPR was proposed to improve the process.

SCM-BPR was shown to be an effective tool to improve the communication process. In this case, the use of a coordination team was proposed to closely monitor and update the information for XYZ. With this SCM-BPR process, the company would gain benefits from the improvement of communication flow by reduction in process lead time, inventor turn over and delay problems.



### **5.3 Theoretical Implications**

This research uses SCM-BPR to solve the problem of communication flow and information flow that occurred in XYZ Company. From this research, it was illustrated that the BPR technique provides benefits on the improvement of the process flow. First, the firm gains knowledge on how to perform data collection and the analysis of the root cause of the problem. Several data collection technique such as interviews and direct observation are discussed in this research. Fishbone diagram is used to identify the root causes of the problem. Then, the firm could start Six's steps of implementing SCM-BPR that is proposed in this research to identify new BPR to solve the problems.

The proposed results of this research showed the success improvement of the process lead time by using BPR technique. From this research, reengineering process leads to the improvement of supply chain performance. The reduction of process lead time by centralizing the control information increases the performance of the communication process. From this research, BPR trying to identify and eliminate non important process which similar to some "Waste" (inappropriate processing and waiting time) in Lean concept. The elimination of waste and reengineering the process would lead to the improvement of value streaming in the firm. Thus, BPR proves to be one of the many tools that can improve the supply chain of the company.

Further research on how to apply BPR with Lean concept to improve the firm process is highly recommended.

### **5.4 Managerial Implications**

This research would help Company XYZ to understand the problem of information and communication flow between three departments and solve problems by using BPR techniques. This research concludes the proposed project for solving the problem of communication in details. Data collection is performed and the analysis of the root cause is discussed. Six's steps of BPR implementation are discussed in details with

current data figure of XYZ. Then, BPR are proposed and, the result of the current process with the new process is compared. The proposed results show the improvement of the business process performance by applying new BPR model. Thus, XYZ could use this research to start pilot projects in the real environment to see the significant changes by using the new BPR model. However, this BPR implementation requires high participation and cooperation from each department. Thus, managements' participation is the key of success to this project. Management needs to instruct, set policies and monitor closely to ensure that each staff performs this project strictly. Otherwise, the significant changes in this project shall not be maximized.

Moreover, Company XYZ can use this research as a guideline to apply the BPR concept to improve the communication flow in other departments. When there is a problem in the process such as lack of communication or long lead time process, the manager of that particular department or management level would have the responsibility to conduct a new way to dissolve the problem. Firstly, the root cause of the problem has to be analyzed by using the fishbone technique. Then, analysis of the organizational structure and process mapping must be performing to find the process problem. After the problem has been analyzed, the using of IT or cross functional teams will, then, be applied to solve the problem. Once the new process is proposed, the pilot project will be launched for evaluation of the results. If the performance of the proposed procedure is acceptable, then, the proposed process will be run in a real working environment. The benefits of this are to know the root cause of the problem in the process flow and redesign the flow to improve the process. The improvement of the process can lead to the reduction of process lead time and increase the accuracy of the information data.

This research also identified some other areas which can be improved by management and beyond the scope of this study.

### **1) Optimize usage on SAP system**

As stated above, the level usage on SAP system in this company are not maximized. Thus, optimize usage on SAP system and its impact can be studied in future research.

### **2) Cross functional team**

This research use coordination teams to connect between each department. However, the performance of cross functional teams is recommended for future research. The impact and results are compared to check the benefit of using coordination teams and cross functional teams, for future research.

### **3) Standard Operation Procedure (SOP)**

One of the recommendations was to set up the SOP in order to carry out work between each department. Currently, the XYZ Company has only working procedures in each department. The study of the impact and results of comparison once the SOP between departments has been conducted are recommended for future research.

## **5.5 Limitations and Recommendations for Future Research**

The research data was collected only for the XYZ Company. The problem and the solution in this research could not be applied to other companies. In addition, while this study proposes the solution in the conclusion part, it does not implement concepts in the real environment since it is out of the scope of the study. Future research might be conducted in order to find the results of implementation of SCM-BPR and check whether the increase of communication performance would reduce delays and inventory problem or not.

Another limitation of this study is the use only a single concept which is BPR to demonstrate the solution. In reality, there are many strategies to solve the solution to

this problem. Future research may explore more on the result of other strategies in order to generalize the concept.

This research proposed only expected results. By applying this proposed BPR technique in future research, at least a period of 6 months to 1 year is needed to check the significant change using the new BPR process.



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## APPENDIX A

Owner and Department Managers' Interview Questions

### **Owner and Department Managers' Interview Questions**

1. Comparing between year 2010 and 2011, how is the different such as work load, capacity, and sales?
2. What is the average lead time for the production? Please specific in detail of quantity per days and total capacity.
3. Please describe the relationship between sales, logistic and production department based on your experience. Is there any conflict among the team?
4. When you receive the order, do you have any strategy that helps you to make the decision or planning? If yes, please specific that strategy but if not, please explain how you handle the order?
5. Do you have any problem of the stock out or overstock? If yes, pls describe in detail.
6. How often that you experience the stock out and overstock. And how do you deal with them?
7. How is the competition in the market of this cylinder business?
8. Mostly, who is your customers and why they buy this product from you?
9. In case that you cannot deliver the product to customer on time, does it have any effect on your company? (Please specific) and how you deal with it?
10. What is the feedback from the customers? Please specific when the product was delay.
11. Do you know the word "Business Process Reengineering"? If yes, what do you think about it and what is your expectation on this changing?
12. Would you like to add any opinion or any suggestion?