



# BUSINESS PROCESS REDESIGN IN A JEWELRY FIRM

By  
SAKULTARA TEERAWUT

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

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

Martin de Tours School of Management  
Assumption University  
Bangkok, Thailand

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Approved for Graduation on: August 30, 2014

Martin de Tours School of Management and Economics  
Assumption University  
Bangkok, Thailand

August 2014

**Assumption University**  
**Martin de Tours School of Management and Economics**  
**Master of Science in Supply Chain Management**

**Declaration of Authorship Form**

I, Sakultara\_Teerawut

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 Redesign in A Jewelry Firm

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ADVISOR'S STATEMENT

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

Signed: \_\_\_\_\_  
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Date \_\_\_\_\_ September 5, 2014

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Sakultara Teerawut

Assumption University

August 2014

## ABSTRACT

Business process redesign (BPR) is similar concept which is applied to redesign the new collection process in the jewelry company. The research was conducted as a case study using business process redesign in order to identify improvement areas in the product development process.

During 2012-2013, the delayed delivery the new items of MGT Company were dramatically increasing. These increases of delayed delivery were also effective with income of the company, while an increase in the high amount of penalty fees also took place. Therefore, companies were discussing the best solution to solve this delayed delivery problem. Hence, the business process redesign technique was chosen to analyze the problem and propose a solution. The results of this study show that the problems of delay were cause from the mock up sample process in the product development department. The key is this process takes a long lead time. On the other hand, multiple revisions of the mock up sample process always revised as per marketing's comments. The solution was applied to the business process redesign during the product development process was performed. The expected results were reduced product development process lead time and accurate information with related departments. The results then lead to the on time delivery to customers.

The results of this project are related with business process redesign and can be applied to the new collection process successfully. After following the step by step process involved in business process redesign (BPR) to understand and analyze the outstanding process the total lead time, the new collections are compared.

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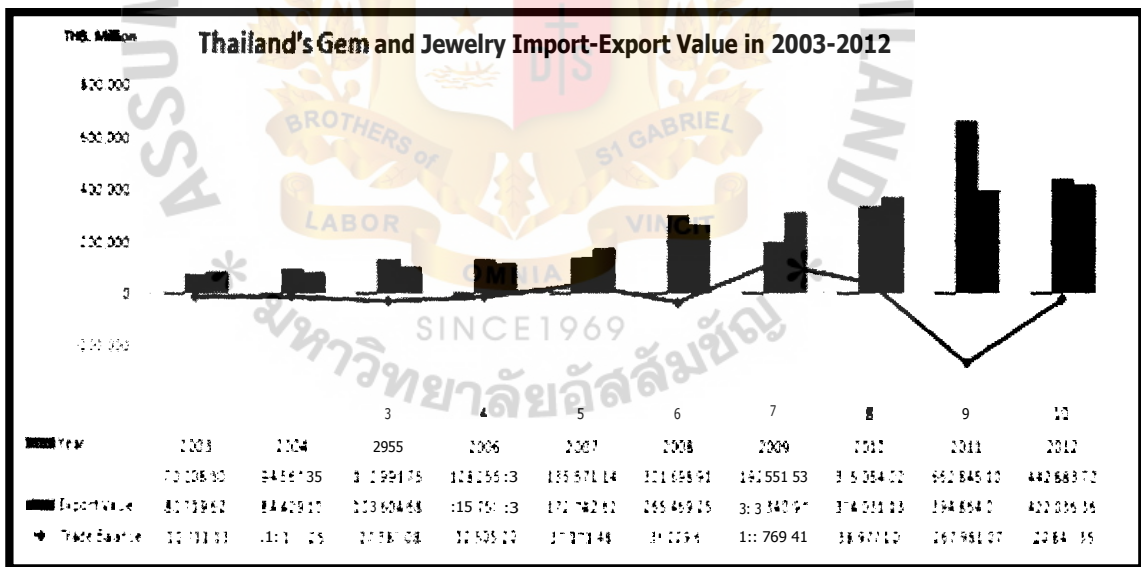


## CHAPTER I

### GENERALITIES OF THE STUDY

The jewelry industry is one of the biggest Thai export industries that generates economic benefits. According to the report of the Ministry of Commerce and Thailand's Gem and Jewelry in 2013, the Jewelry business in Thailand was among the top ten of total export values. For instance, revenue was 8,270 million US dollar in 2008 and increased dramatically to 13,147 million US dollars, or approximately 59%, in 2012. Figure 1.1 shows Thai import and export values of jewelry products from 2003 to 2012.

**Figure 1.1: Thailand's Gem and Jewelry Import-Export Value  
During Year 2003-2012**



Source: The Gem and Jewelry Institute of Thailand (2013)

Runfola and Guercini (2013) stated that fashion trends normally change seasonally. In the jewelry manufacturing business, lead time is the major success factor to reaching customer satisfaction. Retail shops need to ensure that their products are always available in the shop prior to or, at least, at the same time as the competitors. The jewelry business is fast moving and it is very important to offer new items to markets

as soon as possible. More than in the last ten years, fashion only thinks about novel items, produced based on an internationalization process and for profitable growth only. Nowadays, the fashion businesses tends to follow business strategies that focus on reducing lead time and respond to market trends quickly in order to gain more competitive advantages.

Referring to Nwaeueze and Law (2001), product development is very important for a company in order to create novel items to market. For instance, the new product development becomes increasingly important to competitiveness. As consumers tend to have more demand on innovative products, the production team has to find better and quicker ways of introducing new production processes. Cooper, Lambert, and Pagh (1997) stated that there are many parties involved in the production process such as product development, procurement, research and development, production, and so on.

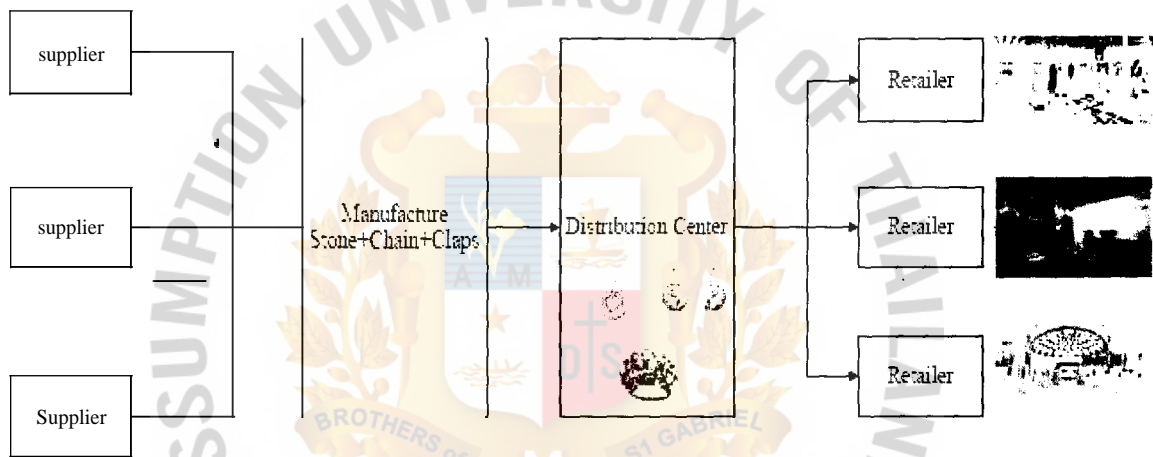
### **1.1 Background of the Research**

MGT Company is one of the leading companies in the global fashion jewelry manufacturing business. The Thai branch was established in Thailand in 1988. Products are mainly composed of crystal and metal material. Many types of products are produced in the Thailand plant such as bangle, necklace, earring, cuff link, and bracelets. The MGT customers are retail and wholesale companies in Europe, America and mainly in Asia. Most customers recognize the value of products in terms of luxury jewelry that usually have new collections with unique designs.

The supply chain process of finished products starts when the MGT Distribution Center places an order to MGT Thailand. For the new product items, i.e. a new collection, the product sample has been developed, shown to and approved by the marketing team first. After that, the order will be placed from the MGT Distribution Center to MGT Thailand. MGT Thailand receives the order from the distribution center and starts to order components from suppliers. The firm prepares the metal parts. The orders of raw components such as stone, chains, clasps and other

components are placed to suppliers in Europe and Asia directly. The lead time of each component is not the same, depending on supplier capacity and policy. The production process starts when all components are received from suppliers. The finished goods are shipped to and kept at the distribution centers in Europe and Asia. The distribution center then delivers the goods to retail shops after receiving the orders. Finally, the customer will see the products on display in the retail shops. Figure 1.2 shows the supply chain process of the MGT products.

**Figure 1.2: Supply Chain Process of MGT Company**



Source: MGT Company data

In addition to the regular products, the new collection and novel items are produced and delivered to the distribution centers twice a year for two seasons (i.e. Spring-Summer and Autumn-Winter) collections, so called the "SS collection" and "AW collection." Each collection consists of 200-300 product items with different designs. The novel items must reach the retail shops at least one week before the launching date. As the retailers are located in different locations, it needs approximately one week for the distribution center to distribute those novel items to all retailers. Thus, the products must reach the distribution center at least one week prior to the retailers. It means that MGT has a fixed time period to finish its production process to reach the promotional schedule of each season. The numbers of the novel items for each season are shown in Table 1.1.

**Table 1.1: Launching Period and Number of SKU during Year 2012-2013**

Detail	Year 2012		Year 2013	
Collection name	Autumn Winter	Spring Summer	Autumn Winter	Spring Summer
Month period	July	January	July	January
Number of SKU	282	256	157	160

Source: MGT Database

Normally, there is a total order quantity of almost 300 SKUs in each collection in during a year, but during 2013 both the collection of Autumn-Winter and Spring-Summer orders had a lower quantity, therefore, estimates reduced quantity to 35-45% due to the economic crisis situation in Europe.

**Figure 1.3: Product Development Period**

Development Phase Spring Summer collection

Detail/Phase	Month	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.				Jul.	Aug.	Sep.		
	lead time	16 weeks				14 weeks				2 weeks		4 weeks	4-6 weeks		1-2 weeks		
	week								W1	W2	W3	W4		W1	W2	W3	W4
Design																	
Development																	
Update bill of material																	
Purchasing material																	
Production																	
Delivery goods																	

Development Phase Autumn Winter collection

Detail/Phase	Month	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nor.	Dec.				Jan.	Feb.	Mar.		
	lead time	16 weeks				14 weeks				2 weeks		4 weeks	4-6 weeks		1-2 weeks		
	week								W1	W2	W3	W4		W1	W2	W3	W4
Design																	
Development																	
Update bill of material																	
Purchasing material																	
Production																	
Delivery goods																	

Source: MGT Company data

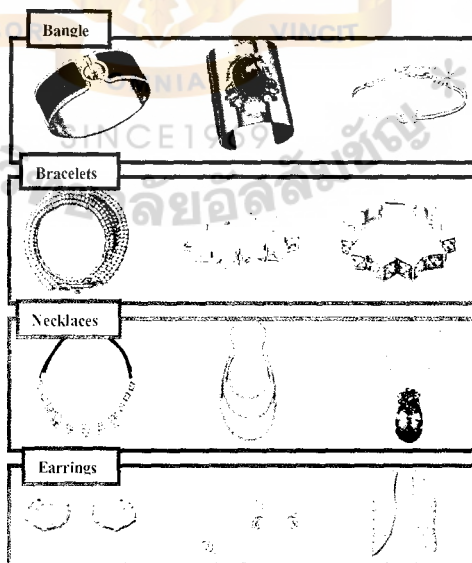
Figure 1.3 shows the timeline of product development of each collection. The Spring-summer collection starts from November. The Marketing team in Europe provides total new item designs to the product development team of MGT Thailand.



The product development starts by making a mock up of the sample and submits it back to the marketing team in order to reconfirm whether the product is approved or major or minor changes are required. Then, the new mock up must be done based on the feedback and resent to the marketing team again. During this process, the costing team creates a primary bill of materials list. The BOM is created based on the first design. The BOM is then sent to the procurement team in order to place orders to the suppliers. The orders are placed once a week or 4 times in a month since there are various products and lots of raw materials which are required. MGT starts the production process after receiving all raw materials and takes approximately 4 weeks to complete and ship to the distribution center in Europe. Distribution centers would then launch the products to the retail shops. For the autumn-winter collection, the production lead time is about the same but it starts in May and finishes in the middle of March of the next year.

The MGT products can be categorized into four categories i.e. bangle, bracelets, necklaces and earrings as seen in Figure 1.4.

**Figure 1.4: Example Product of MGT Company**



Source: MGT Company data

## 1.2 Statement of the Problem

The major production process of the novel products, i.e. new collections, includes product development, costing, and procurement. Currently, the product development process lead time is very long especially in the mock up and sample making. As the readjustments of the designs are done several times by the marketing team, many new mock up samples must be developed. A large amount of time is consumed during this process for instance, generally a mock up sample lead time is 14 weeks but sometimes approving a sample takes more than 14 weeks. However, the bills of materials are created initially for the first design. Any changes or revisions of the design means the raw materials must also be changed. Thus, there is an accuracy problem in the BOM of the raw materials since it is done before the readjustment of the design. As the BOM can be adjusted once a week in the system, the procurement department has to recalculate and create the new list of raw materials and release the purchase order documents to the suppliers manually. Even though the procurement department tries to readjust the BOM, the high discrepancy of the orders and actual materials used is illustrated. Some materials are cancelled before delivering while some are kept as unused materials at the company while some materials reach the MGT later than the production plan. This affects MGT not only on the excessive cost of materials but also in delays in the production process. Therefore, the question "How would MGT redesign the process of a new collection" is emphasized in this study. The delayed delivery to the distribution center is one of the serious problems of MGT as shown in Table 1.2.

**Table 1.2: Total Delivery Quantity and Total Loss Values of Collections**

	<b>Year2012</b>		<b>Year2013</b>	
	AW 12	SS13	AW13	SS14
<b>Total Quantity(Piece)</b>	39,064	30,211	25,141	12,194
<b>Total values (THB)</b>	28,267,899	15,003,849	13,158,313	6,325,562
<b>Delayed Quantity (Piece)</b>	13,372	8,408	19,800	8,042
<b>Total values (THB)</b>	11,295,624	5,527,206	10,100,293	4,640,152
<b>Penalty Fee (TUB)</b>	1,100,000	553,000	1,010,000	464,000
<b>Delayed Quantity (%)</b>	34.23%	27.83%	78.76%	65.95%
<b>Loss Values (%)</b>	39.96%	36.84%	76.76%	73.36%

Source: MGT Company data

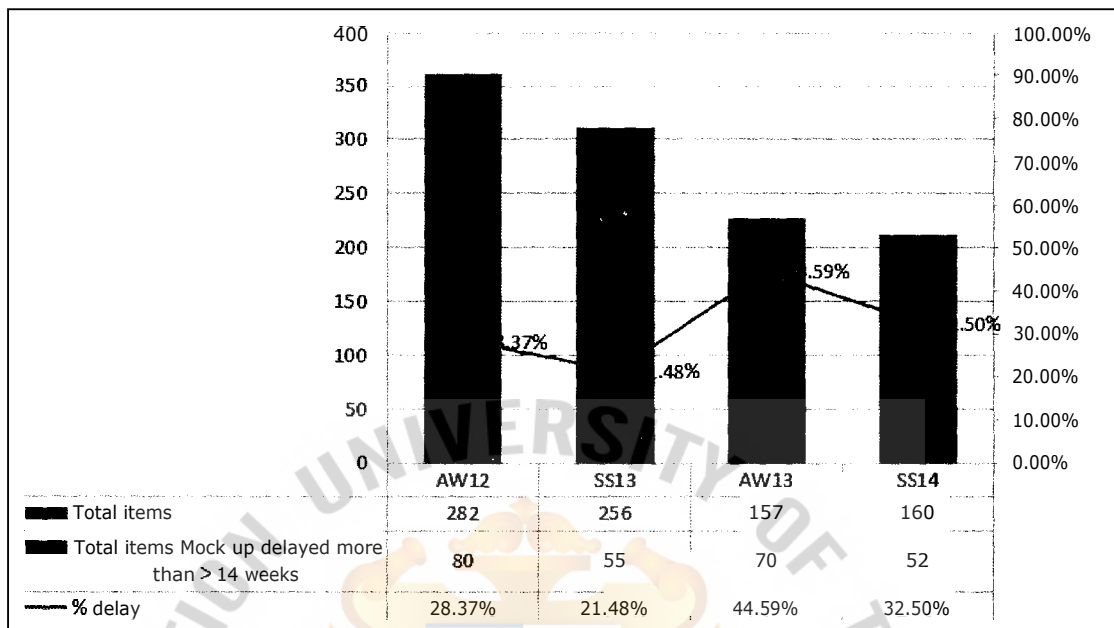
Note: AW means Autumn Winter; and SS means Spring Summer.

Referring the table 1.2, the loss values in percentage come from the below formula;

$$\text{Loss Value (\%)} = (\text{Total Delay Values} / \text{Total Order Values}) \times 100$$

The loss value percentage is the proportion of the total value of each collection which impacts the firm. The impact is that the MGT Company has to pay the penalty fee to suppliers since the firm placed orders to them in order to reserve both components and capacity. This also impacts the suppliers to face with their production planning and processes since time available is very short for their production. As such, the problem, "How would MGT redesign the process of a new collection?" is of interest.

**Figure 1.5: Total Items Mock up delayed process**



According to the mock up data, MGT Company found the mock up delay more than 14 days of AW12 is around 80 items out of 282 items which are approximately 28.37% of delay. In SS13, the company found that 55 items are delayed from 256 items and it will be approximately 21.48%. In AW13, the company found that 70 items are delayed from 157 items.

### 1.3 Research Objectives

The objectives of this study are:

1. To identify the root causes of the inaccurate orders for raw materials and production delay problems in the product development process of the new collections.
2. To apply business process redesign (BPR) to redesign the product development process of the new collections.
3. To identify possible outcomes of the new product development process of the new collections.



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

This research focuses on the production process of the new collections while other products are not covered. The data are collected from company reports of the product development, procurement and logistic departments from 2012-2013. The order of new collections, number of delayed items and production lead times are collected. Business process redesign is used to redesign the production process of the new collections.

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

The expected benefits from this study are mainly to make an improvement of the work flow between design and product development, costing and the procurement department of MGT Company by using Business process redesign (BPR). The business process redesign would help analyzing the areas of improvement and eliminate waste time in order to shorten process time of the new collection. This study would help the company to get more benefits when the new collection has been launched on time.

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

This study mainly focuses on improving the business process of new products by considering the product development process which is a core process for launching on time. There are some limitations concerned with this research as stated below:

- The arrival time of approved items from the marketing department is limited due to external factors and uncontrolled causes. For instance, the time zone between Europe and Asia or even the initiative of new ideas during the mock up and sample making process are uncontrolled.

The research will focus on where the company spends time and misses deliveries for samples. The research will not go through the details of each process and show the root cause for business improvement.

The cross-functions in the company will not be focused on in this research.

## 1.7 Definition of Terms

Bill of Material(BOM)	BOM is formed with the parts list which is a required list of raw materials in the product (Shamsuzzoha , Kyllonen, & Helo , 2009).
Business Process Redesign (BPR)	The company's activities to rearrange internal operations to improve product distribution and delivery performance for customers (Tinnila, 1995).
Procurement	Sourcing material in order to fulfill inventory levels and reorder points and provide a material base for users the organization identifies (Fawcett, Ellram & Ogden 2007).
Product Development	Cross functional teams drive operations, supply chain activities, product plan creation and evaluation (Bozarth, Handfield, & Chandiran, 2013).
Purchasing Order (PO)	The document is a specified purchase condition as an agreement and inducts supplier action (Fawcett et al., 2007).
Purchasing Requisition (PR)	The document is clear and specific as to the user needs for sourcing and includes further information such as material descriptions, purchase quantity, delivery dates & delivery addresses and requisition department (Fawcett et al., 2007).

Stock keeping unit (SKU)

Representative product items of stock which completely indicate the style, size, color and function (Silver, Pyke, & Peterson, 1998).



## **CHAPTER II**

### **REVIEW OF RELATED LITERATURE**

This chapter presents and reviews the related literature mainly on the business process redesign concept for understanding how to map a current process and improve business processes during the new product development phase. The relevant literature in this chapter includes: 1) business process redesign and implementation of the business process redesign, 2) root cause analysis; 3) product development 4) process mapping in the supply chain 5) supply chain mapping approaches; and 6) inventory management.

#### **2.1 Business Process Redesign (BPR)**

Business process redesign (BPR) is an intimated concept with business process reengineering. The main difference between them is the range of process improvement projects. Business process reengineering reevaluates the whole process of the company including organizational structure, information systems, people and technology because the current process is no longer productive. Then, new processes are designed where good qualifications in terms of efficiency and effectiveness are expected. Business process redesign focuses on reevaluating and rethinking the new business and can be redesigned by considering the existing critical processes. Analysis and comparison of the alternative processes can be done. Then, the measurement of the performance such as cost, lead time and quality of the related processes would be performed in the final stage (Van der Aalst & Van Hee, 1995).

Business process redesign is considered an existing organization process as it takes important views of the scope of change into account so, important parts of any process redesign are the definition of appropriate performance indicators for the processes. Then, using such indicators to measure the outstanding process and later redesigned process, this is an advantage for both evaluating the process redesign



application and to monitor and constantly improve the ways in which the process is carried out (Kam & Yung, 1997).

### **2.1.1 Benefits of Business Process Redesign**

Business process methodology should provide "a complete set of techniques and guidelines which will enable the business process redesign to reorganize business activities and processes in an organization". There are several key elements to using business process redesign methodology stated as follows:

1. Gathering the knowledge, experiences and ideas, in a format which is make more understanding and can be evaluated and tested.
2. Business process redesign simplifies planning and monitoring. BPR design allows organizations to present an overview of the process and issues.
3. Business process redesign methodology supports the firm to understand their tasks and roles. Business process redesign leaders will explain and define clear communication to the team.

Finally, the implementation of the business process redesign needs the person who has skills to deal with modeling, organizational development techniques and change (Valiris & Glykas, 2005).

According to Tinnila (1995), the business process redesign prefers to achieve the cost savings by rearranging the process in the firm. Nevertheless, often the business process redesign presented operational process. The explanation of the process is duplicate or mostly similar For instance, product development process operation versus the research and develop department.

### 2.1.2 Perspective to Business Process Redesign

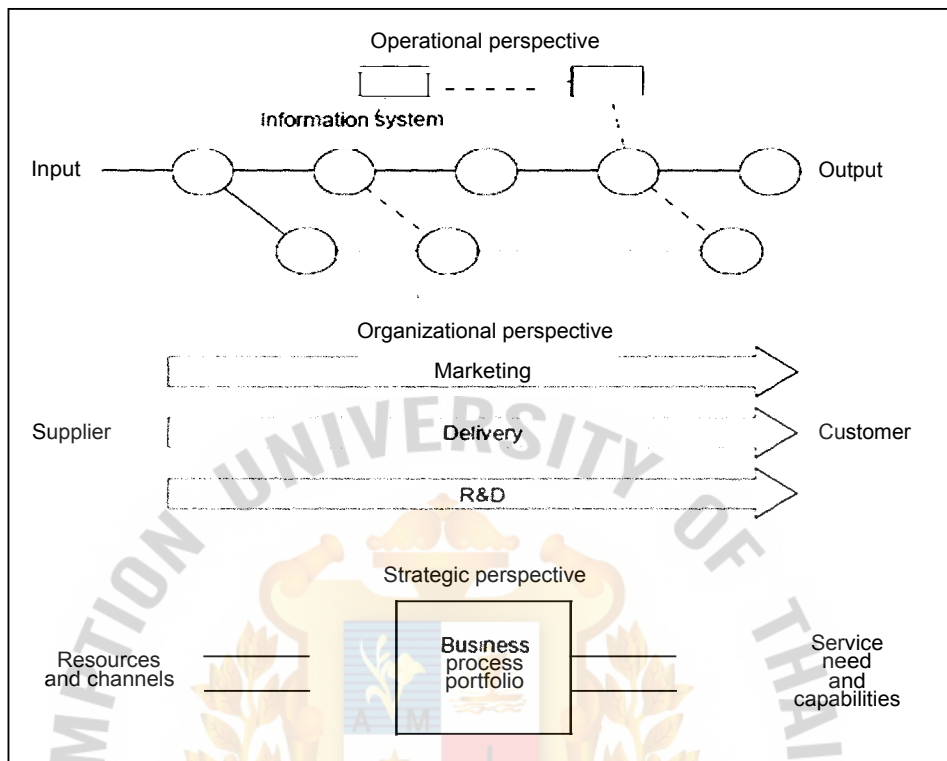
There are three perspectives to business process as shown in Table 2.1 and Figure 2.1 as follows:

**Table 2.1: Business Process Perspectives**

<b>BPR Perspective</b>	<b>Detail</b>
Operational Perspective	The key element is performing normal operations by using information technology in order to reach sustainable production; improve effective operations by using networks and information systems. Lastly, the firm will meet competitive advantages.
Organizational Perspective	Designing business processes improves organizational performance by using coordination between departments in the firm, organization and human resources are required in order to get further improvement in effective ways.
Strategic Perspective	Using staff in the firm to map the processes and transform strategic capabilities and provided services as customer want.

Source: Tinnila (1995)

**Figure 2.1: Three Perspectives on Business Processes**



Source: Tinnila (1995)

Figure 2.1 shows the acknowledged perspectives of business processes started from an operational perspective with certain inputs, outputs and customer information technology is a key player of each node of processes. Operations are expanding at different functions in the organization. The process is focused on the critical processes of the company and the development these processes. Lastly, a strategic perspective is expanded to suppliers dealing with strategic alignment based on customer requirements.

In the supply chain, the effective management of business processes are the flow of information, product and money across the supply chain. The highest supply chain cost comes from operating activities that may be as high as 75%. Also, the process can increase customer values (Bozarth, Handfield, & Chandiran, 2013).

Bruckner, Vail, and Alpern (2007) stated that there are techniques for business process redesign, all of these focused on the flow of information and the spreading of knowledge in business processes as follows:

**i. Encouraging asynchronous communication of information**

Synchronous interchange of information involves people interacting right away, for example contacting by telephone, while asynchronous exchanges involve people interacting at different times.

Practically, formal business collaboration uses e-mail to communicate because it is less costly and a faster form of communication. The firm should encourage the asynchronous communication of information across business processes as much as possible.

**ii. Reducing information duplication in static repositories**

Use the standardized data then the system will generate more efficiency. Thus, organizations can deploy in each business process.

**iii. Eliminating unnecessary information flow**

The excessive information is a non-value add to an organization. The firm should select only essential information for business operations and eliminating unnecessary information often becomes an exercise of improvement.

**iv. Reducing contact points in a process**

Mostly, amongst business processes in an organization there are unnecessary contact points. So, the contact points increase cycle time of the whole business processes therefore, reducing the number of contact points may make improvements to a business.



**v. Minimizing knowledge transfer in operational processes**

The organization should promote the exchanging of knowledge to perform the appropriate procedures. It is important to emphasize that this will be successful and this knowledge must come before the time of the execution of those processes.

**vi. Maximizing knowledge transfer in organizational learning processes**

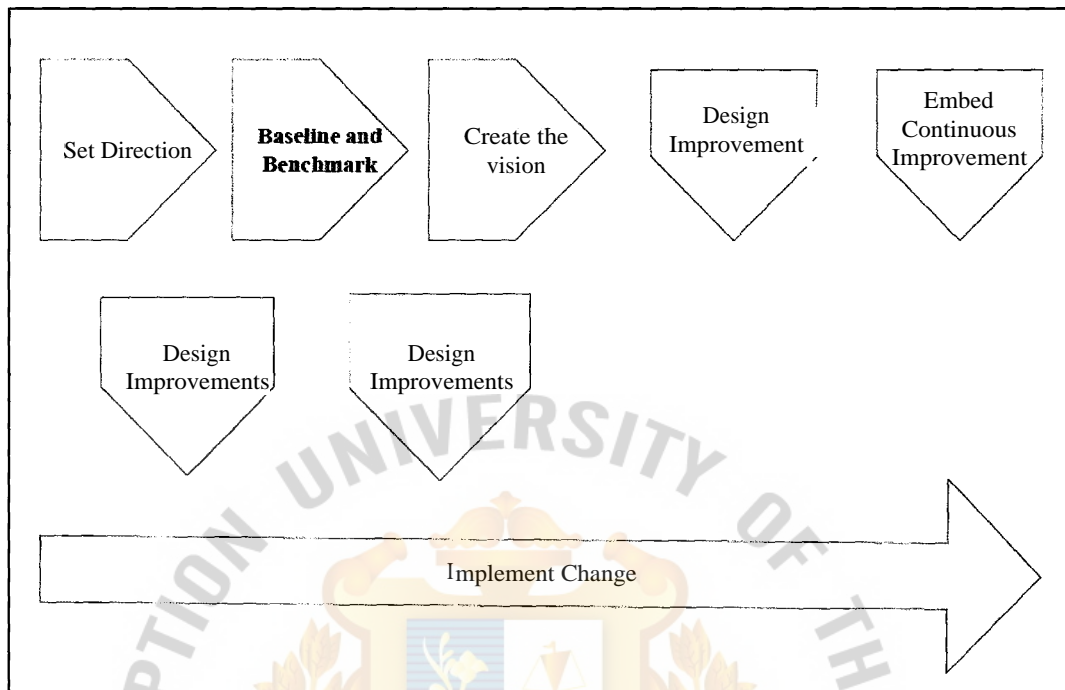
Business process redesign is more effective than training or meeting because it involves parties who are involved with the change of this process.

The key point of business process redesign is the question "How to make sufficient change and do it step by step" so, business process redesign projects are focused on each activity and recommends changes. Al-Mashari and Zairi (1999), said that there are several BPR success factors in order to achieve business process redesign goals that include change management systems that imply all human and social related change and cultural amendments into working practice so, this portion is a difficult point to redesign and a new process which deals successfully with the struggle. However, there are other related factors e.g. effective communication, empowerment and reward for motivation that needs to be focused on.

**2.1.3 Implementation of Business Process Redesign**

Harrison and Pratt (1993) mentioned that the method of process improvement is cross-functional teams and they will displace the disciplines as the critical organizational unit of world-class companies. It is not easy to change the existing process to a new process because there are many parties involved in the process. The below implantation will support organizations to have a clearer picture of how to manage improvement issues shown below in Figure 2.2.

**Figure: 2.2 Business Process Redesign Steps for Organization**



Source : Harrison and Pratt (1993)

Figure 2.2 shows the structural methodology for process change step by step. Table 2.2 below shows the outline of the business process redesign phase including steps taken and key activities.

**Table 2.2: The Steps to Implement the Business Process Redesign**

	Steps Taken	Key Activities
e ect	1. Set up direction	Set up the process which needs to be redesigned. Who will be members in the team and who gets benefits of the target of this redesign.
	2. Baseline and Benchmark	The team needs to learn processes from the start to the end of the process. Also, they can identify process outputs according to customer requirements. The team is able to establish the baseline for cost, volume, defect rate or how they can bring more efficiency. They also benchmark practice and set up the goals and objectives.
	3. Vision	
	4. Lunched problem-Solving project	The team is able to visualize the future process. The team needs to spend time to convince their objectives and goals to the organization. To be successful the team needs to buy-in to the total organization or company.
		The team concentrates its objective according to the baseline and benchmark. After the problem has been solved or the process has been improved, the team will hand it over to the line manager to follow the process in organization or company.
Improve	5. Design improvement	The team has a priority to improve existing processes and also they are able to draw what the future process should look like. They can draw processes or show in blueprints and it is able to create a road map as well.
	6. Implement change	It started when the baseline and benchmark were finished and continued with problem-solving. Buy-in from a line manager is necessary because the program can fail if they drop the ball in order to avoid a pitfall. It should be clear cut when the process change is finished and it's time to implement training to employees.
Evaluate	7. Embed continue improvement	Teamwork must be embedded in the new management and their behavior. The teamwork will replace the old management methods. The people have been trained and coached by the line manager, so the organization will be continuously improving as a result of them.

Source : Harrison and Pratt (1993)

In addition, there are some successes factors during business process redesign implementation which have to be followed as shown below:

1. The vision must be shared. The purpose of changing has to be communicated with all involved people in the organization.
2. The goal and big picture has to be shown to people in the organization in order to convince them.

3. Management and people need to have some skills or equipment in order to drive the process together.
4. The organization should consider people closely because people have feelings and sensitivities.
5. If the organization uses consultants, it is good to involve their people so that the new process has been reviewed.
6. Given the total process scope of business process redesign reviews, the organization can assign to the appropriate people. The line managers need to be involved.
7. To ensure buy-in, people must be active when the implementation starts. The people should realize that the new process can bring more benefits to them.
8. Cross-functionality has to be implemented. This is to avoid conflict during implementation and to drive the implementation by teamwork.
9. To ensure that the business process redesign changes the process of people with new ways and new technology. Some companies invest a lot of money on IT technology, so it will not become a reality.
10. The approach of business process redesign is to be able to drive out diversity, while the induction will destroy people who want to learn new process.
11. To be open-minded. The people can be open to new techniques methodologies and the support from IT is one of elements of what needs to be done.
12. The organization should not compare the process with alternative processes that are available. People do work well generally.
13. The people know what needs to be done and generate value to the organization. Keep it simple and clear regarding what is important and what is required.
14. "Trust," should be there among people because the business process redesign is cross-functional.
15. Ensuring follow-up sessions for people who work in each phase of the redesign.

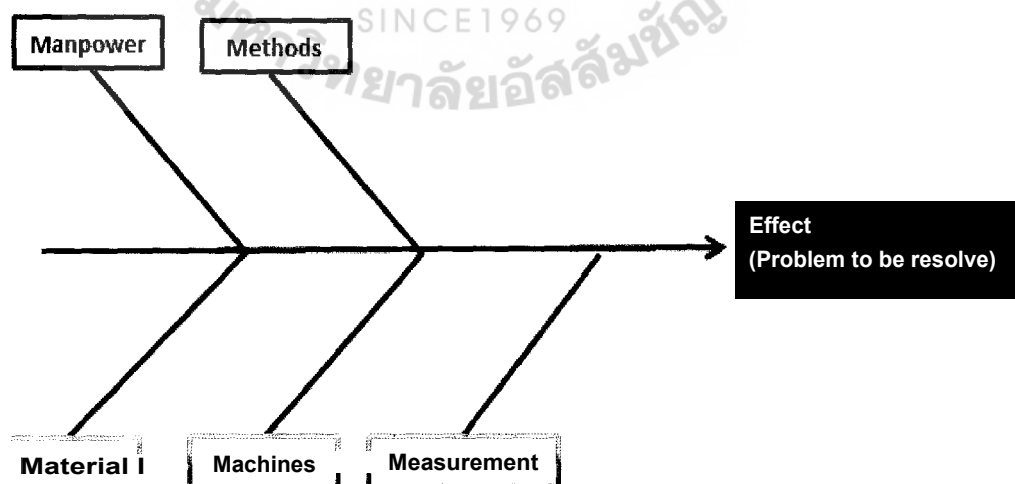
The above are the factors and steps of the successful business process redesign implementation (Thomas, 1994).

## 2.2 Root Cause Analysis

According to Bozarth et al. (2013), root cause analysis is a process for a company which is interested in business improvement. Brainstorming is used to define the root cause in the organization. It comes to structure analyses and data gathering. The organization often divides the root cause in three phases; open, narrow and closed. The open is brainstorming. The team is free to make suggestions, no matter if it is right or wrong. The team often uses a cause-and effect diagram (also known as a fishbone diagram or Ishikawa diagram). To construct this diagram the members must describe effects for which they are seeking and the team can analyze root causes by using the Five Ms. as shown in Figure 2.3.

- Manpower: People who do not have the accurate skills, authority, or responsibility.
- Methods: Poor business practices; poor process, product, or service design.
- Materials: Bad quality inputs.
- Machines: Equipment that is not capable.
- Measurements: Performance measurement that eliminates the problem.

Figure 2.3: Fishbone Diagram



Source : Bozarth et al. (2013)



The second phase of root cause analysis is the narrow phase. The concept uses the five 'Whys.' The team uses brainstorming and answers to the question "what is this cause of the original problem?" For each new answer, they repeat the question until they do not get a new answer anymore then the last answer might be the one causing the problem. The name comes from the question process which requires up to five rounds.

In order to better understand how to perform and start the questions in this study, the person who can provide the question and answer should be a member in the process that is facing the problem. However, an example question for instance, the business would like to understand why a customer is no needed to pay the bills on time. One assumption is that the customer is getting a free loan at the business's expense by delaying payment. The efforts must come from facts, and there is no opinion in this brainstorming. At the end, they will find the root cause and verify it before moving to a solution.

The third phase of the root cause is the closed phase. The team will use data and analyze it by using a scatter plot, check sheet, and Pareto charts. A scatter plot is a graphic which shows the relationship between two variables, especially root cause and effects. Check sheets are used to collect the frequency of activities or events, and Pareto charts will be used to plot the frequency from highest to lowest. This study selects a fish bone diagram only for analysis of the root cause of problem.

### **2.3 Product Development**

The new products of a company come from product development. It is not only them who can do it, but they also need some people in the organization or in the supply chain to support their activities. The relation will also impact other departments when the business process redesign has been implemented in the product development (Fawcett et al., 2007).

### 2.3.1 Development Process

Table 2.3 presents an example of product and service development which includes five stages of BPR and focuses on the operations, supply chain function and also engineering and marketing as well.



Functional Activities	Concept Development	Planning	Design and Development	Commercial Preparation	Launch
<b>Engineering</b>	Propose new technologies; develop product ideas.	Identify <i>general</i> performance characteristics for the product or service; identify underlying <b>technologies</b> .	Develop <i>detailed</i> product specifications; build and test prototypes.	Resolve remaining technical problems.	Evaluate field experience with product or service.
<b>Marketing</b>	Provide market based input; propose and investigate product or service concepts.	Define target customers' needs; estimate sales and margins; include customers in <u>development effort</u> .	Conduct customer tests; evaluate prototypes; plan marketing rollout.	Train sales force; prepare sales procedure; select distribution channels.	Fill downstream supply chain; sell and promote.
<b>Operations and supply chain functions</b>	Scan suppliers for promising/ technologies/ capabilities.	Develop initial cost estimates; identify key supply chain partners.	Develop detailed process maps of the operations and supply chain flows; test new processes.	Build pilot units using new operation; train personnel; verify that supply chain flows work as expected.	Ramp up volumes; meet targets for quality, cost, and other performance goals.

Source : Bozarth et al. (2013)

Bozarth et al. (2013) concluded that there are five steps of the development process as shown below:

1. **Concept development phase:** the members in the development process identify new ideas or revised services. The idea comes up from various sources. For example, purchasing may source possible suppliers who can guarantee technology that turn into a new product. Finally, if the concept is approved; it will pass to the planning phase.
2. **Planning phase:** the company starts to modify the possibility of the product. Even though the ideas look pretty good in the concept development phase but may fail on this phase for several reasons. For example, finished goods are too expensive; they may lose profit when they are launched into products to the market.
3. **Design and development phase:** this phase starts from making and evaluating the sample with fully functional products or semi-products. The design and development phase will be complete when the company approves the final design for the product and related processes.
4. **Commercial preparation phase:** operations and supply chain members need to support the product in terms of new facilities, warehouses and even information systems to handle production needs.
5. **Launch phase:** Making the product and serving it to the market with good quality, cost and delivery targets while taking the corrective action for customer needs.

There are two model of development process (Bozarth et al., 2013).

- 1 **Sequential Development** is the new product or ideas which must be clear and specific before they can go to the next development step. It means that it should be done step by step so, this model takes a lead time due to not overlapping activities.
2. **Concurrent Engineering** can allow the overlapping activities in the development process to work at the same time. For example, the engineering can build and test prototypes before the final product will be finalized. However, this

process needs to work in very tight coordination. Besides, the product development is a cross function effort in organization with the below:

Engineering team is the one who supports technology, specification and innovation. The team can consider which technology is matched to produce the product and which specifications of materials are needed or used for the product. Also, the team can invent some machines or tools in order to produce mass production as fast as possible.

Marketing is the primary responsibility to know markets. Who buys our product or service? How much can they pay? Who are the company's competitors? In addition, marketing is the one who selects the distribution channels and promotes new products to markets.

Accounting team is the one who keeps all reports and shows the cost of products or services to the organization. Also the labor hours, labor cost and facilities are needed.

Finance is the team who informs the financial impact of product development. How much can the company get back in profit from its investment? What is the return ratio? How risky is this project?

A designer is a person who is not only designing new products or services, but also creates unique new products. For example, the logo of the company and packaging are designed by the designer.

Purchasing is one who supports in the development of many roles. To identify who are the best suppliers of raw material and who will be the best resource for the unique products or services. Moreover, purchasing can consult the material markets, substitution of raw materials, forecast quantity, tracking delivery and consult innovation of product development.

Suppliers are also one of the important roles. They can bring the real perspective to the table. Bringing the supplier in at the beginning of the development stages is called information sharing. They can advise capabilities, and prepare procedures of work. The supplier can answer the questions of product development. For example, the target of producing window motors is lower than 15 USD and the weight is not over 1 pound. It is good to narrow down requirements to suppliers and they can provide you the right material for



new products or services.

To produce the new product items, the new product development has made the new product or service which can reach the cost target and when the new product has been launched, the new product will turn to operations. Moreover, when the product is launched, the new product development will no longer be involved. The measurement performance of new product development will come from sales, profitability and the ability to reach the market (Bozarth et al., 2013).

## **2.4 Process Mapping in Supply Chain**

Fawcett et al. (2007) concluded that a process is specified as an activity that modifies or changes inputs into a new output by using graphic representation of a system that places a sequence of steps that are executed to produce some required output. The objective behind that is to better understand a complicated system.

The process can also break down a system into subsystems where the boundary or obstacle has to be solved or improved. The supply chain is made of a series of manufacturing or service processes, including procurement, new product development, and transformation of raw materials, delivery and customer service, and also some useful rules to apply in the process mapping are shown below:

1. Identify the main entity and focus only on activities and flows. It considers what you want to improve in your business. For example, if you are focused on how many days your products takes to get from your factory to customers.
2. Identify clear obstacles and boundaries. It will show in the process which activities can be improved. For example, the delay of products may come from suppliers who deliver raw materials too late, or the inland transportation loss of time from traffic jams.
3. Make it simple. The process can be easily understood and clear from the beginning until the end of product. The complexity of the process may lead to misinterpretation in their business.

After the process has been picked for business, it is good if it can be measured. The process can be delivered in the below criteria (Bozarth et al., 2013).

- i. **Quality:** To keep good quality to the customer. For example, Delta Airline has faced some issues with lost baggage. They set up new processes by using barcode scanners on all bags even when the bag has been loaded onto the airplane. The report can show which bag has been misplaced or lost. After the implementation of a new process and technology, the airline can reduce the number of missing bag of passengers.
- ii. **Cost:** The cost can be reduced from a new process. For example, Delta Airline has used scanners to scan barcodes instead of opening bags and streaming the handling process. This process has reduced manual work from people. At the end, the people can do alternative jobs in order to increase cost reductions to other process.
- iii. **Time:** this information will define the delivery of speed and reliability of service and products. Delivery speed can be improved in order to fulfill a demand. Delivery reliability means that the product has been delivered as promised.
- iv. **Flexibility:** it means the organization can complete the demand of different customers. Flexibility is valued for new product development. The teams like engineers, designers, marketing and supply chain partners are willing to work closely in order to make a new product as fast as their competitors.

## **2.5 Supply Chain Mapping Approaches**

The mapping process can determine what the organization's supply chain looks like and what it should be in the future in order to continuously improve the business process. The approach focuses on understanding and improving supply chain performance (Fawcett et al., 2007).

1. Identify items that you want to map.
2. Identify all of processes that occur in the production pipeline. For instance, clothes products could not be finished without spinning, knitting, dyeing and packing processes as well as the storage of the goods. The process will be finish

when they deliver the goods to customers.

2.1 Determine who performs each process in the chain.

2.2 Determine the time during each process from start until it is finished to the end customer.

3. To start to draw a supply chain map from raw materials to the end customer.

3.1 Start to draw a horizontal line at the beginning process until the end customer.

3.2 Sum total time of all process. The length of the horizontal line you have just drawn is equal to your record. For example, spinning 15 days, knitting 10 days, dyeing and finishing 7 days, cutting 5 days, sewing 18 days, transportation 19 days, and distribution 2 days. The total is 76 days.

3.3 Start with the earliest process and put a name on the process. You can indicate the length of time each process takes.

3.4 Draw the vertical line at the beginning and end of each process in order to average the amount of inventory which is on hand. You can use this information to calculate inventory costs.

3.5 Identify flow modeling for time and costs associated with a process.

4. Analyze the supply chain opportunities: to see the length and conduct if you have a chance to improve the process. For example, the supplier has a long lead time, you may visit them to see and discuss how they can improve this issue.

5. According to point no.4, you can prioritize which improvement is needed to be done first but do not limit yourself to do all improvements.

6. Analyze or monitor the new supply chain, revisit point no.6 and check the results which were satisfied according to your expectations.

7. Repeat the procedure with other supply chains where you believe there are opportunities for improvement.

This approach will create an excellent basis for understanding and improving the organization.

## **2.6 Inventory Management**

The inventory is the large sections of an organization's assets which account for 20% to 40% of total assets. Money bind off in inventory and success or collapse in inventory management could impact the financial situation. High inventory levels involve a lack of effective information sharing because of less communication between supply chain members. Surplus inventory relates to storage costs, markdowns and dead stock. At the same time, having insufficient stock results in a run out of stocks and the improvement of stock accuracy can help to decrease supply chain costs, stock outs level and the level of process quality (Lee, 2000).

## **2.7 Summary**

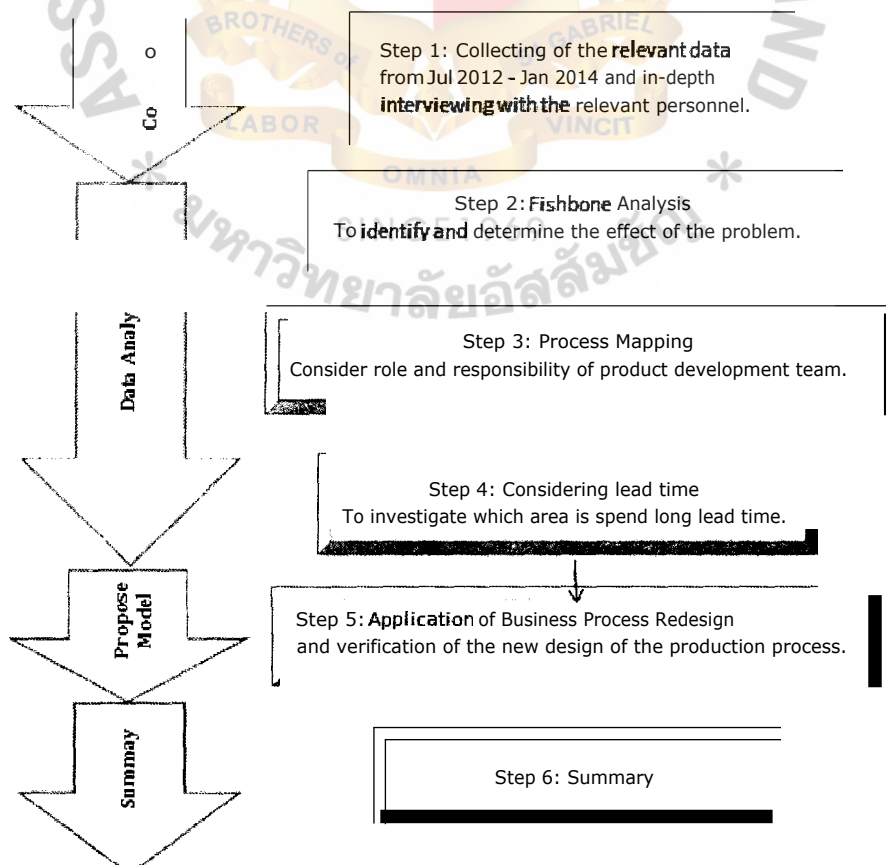
This chapter discusses the related literature. The significant concepts of business process redesign are reviewed. The alternative ways of BPR to improve each process in an organization are discussed. In addition, process mapping that would help the organization to understand the process step by step and how these parties cooperate with each other are reviewed.

## CHAPTER III

### RESEARCH METHODOLOGY

This study focuses on the redesign of the business process improvement of MGT Company in order to solve the problem of inaccurate bills of materials and to avoid the penalty fees from suppliers. The whole product development process including product development, costing, procurement, and product delivery are included in the study. This chapter describes the methodology used in this study which can be classified into three main stages. Firstly, the required data and data collection methods are explained. Then, the data analysis of the fishbone diagram, process mapping and lead time in each process is applied. The last part of the chapter is the proposed model, verification of the new design of the production process and ends with a summary. The main methodologies are shown Figure3.1.

**Figure 3.1: Summary Research Process**





### 3.1 Required Data and Data Collection

Data required for this study includes primary and secondary data. Primary data covers the standard working flow from the product development department, process activities, lead time of each process and information and communication flow across departments. These data would help analyzing outstanding process flows and the current performance. Besides, the secondary data includes delivery reports and penalty fees from suppliers which have been collected.

The historical data related to the product development process in 2012-2013 are gathered. Documents in the product development process are collected from various sources. The required data and data collection methods are shown in Table.3.1.



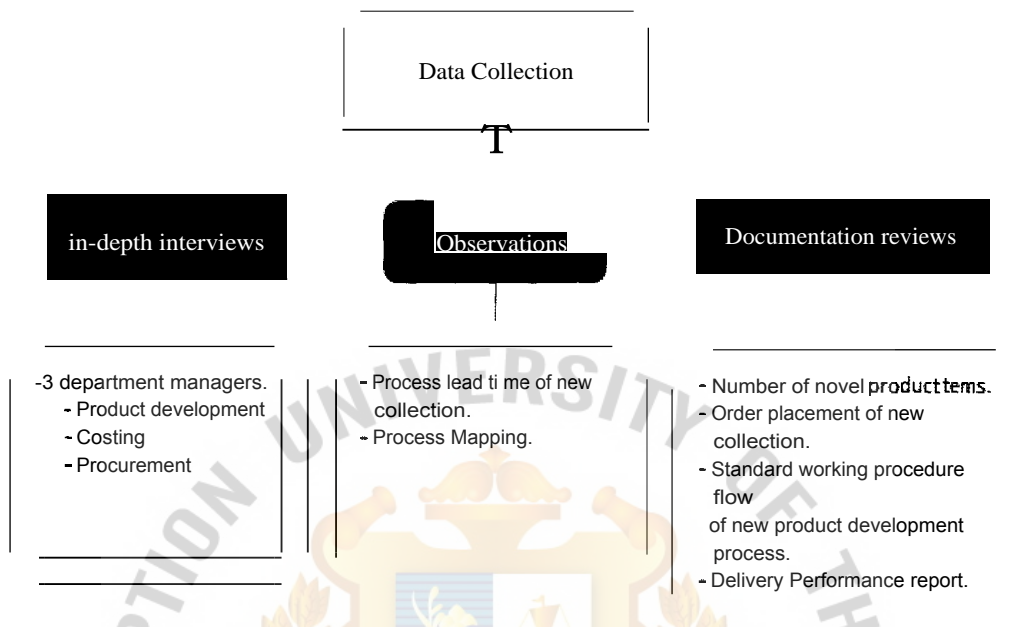
**Table 3.1: Required Data and Data Collection Method**

<b>Data</b>	<b>Details</b>	<b>Data collection Method</b>	<b>Source of Data</b>
1. Number of novel product items	Number of novel products launched.	Document Review	Supply Chain Department.
2. Order placement of new collection	Number of quantity that the Distribution Center placed to MGT Company.	Document Review	Supply Chain Department.
3. Standard working Procedure: flow of new product development process	Working flow of new product development process.	Document Review Observation and in-depth interview	Product Development Department.
4. Process lead time of new collection	Lead time of each process during product development process categorized by activities.	Observation and in-depth interview	Product Development Department.
5. Process Mapping	Existing product development process.	Observation and in-depth interview	Product Development Department.
6. Delivery Performance Report	Total delivery goods to Distribution Center.	Document Review	Logistics Department.
7. Penalty fee from supplier.	Total value of penalty fees from supplier.	Document Review	Accounting Department.

Source: Author

In this study, there are only three methods which are selected to collect the data. Data are collected as shown in Figure 3.2.

**Figure 3.2: Data Collection Method**



Source: Author

An in-depth interview is a data collection technique by interviewing a person to know how one can understand the situation as well as a potential way to explore complex issues from different perspectives on theory (Qu & Dumay, 2011). In this study, interviews are executed with three managers from the Product development Manager, the Costing Manager and the Procurement Manager. They are responsible for the product development process and understand the current process well. The questions can be referred to in Table 3.2.

**Table 3.2 In-depth Interview Questions Guide**

Interview Question	Development Manager of		
	Product Dev	Costing	Procurement
1. What is the main problem during new collection process?	V	✓	✓
2. What do you think the cause and factors of problem are related to?	V	✓	✓
3. How many items needs long lead time more than 14 weeks during mock up and making sample?	✓	x	x
4. Which processes must be focus after reviewing?	✓	✓	✓
5. How many items have been cancelled?	✓	✓	✓
6. How many items have incomplete BOM?	✓	✓	✓
7. What is the good process should look like?	✓	✓	✓
8. What can you do to improve the process?	V	✓	✓

Source: Author

The objectives of the interviews are:

To understand the procedure that these managers use to deal within their departments and collaborate with other related departments.

To understand the nature of information and production process flows and working problems from three managers.

The interviews were collected and analyzed by using fishbone diagrams to identify problems and root causes. The results of the fishbone diagrams are used in the design of the business in order to improve the flow of the processes.

For the observations, the lead time of each process of the new product development process is observed. Activities of each function, including working lead time as well as the responsibility of each department are under observation for the determination the process time.

For the document reviews, the data can be congregated from previous records of all departments in the product development process. Related historical data, which are delivery performance reports, are also gained.

### 3.2 Data Analysis

The data analysis can be categorized into three parts. First is the statistical data that are required to understand the root cause of the problem which would help for the redesigning of the business process. The data are shown in Table 3.3, Table 3.4, Table 3.5 and Table 3.6.

The data shown in the Table 3.3 is the total of new product items per collection categorized by the jewelry categories. Table 3.4 shows the total quantity of the new products and their monetary values. The proportion of the total units of new collection is categorized by collection and product category. The number is reviewed and compared in percentage between 2012 and 2013. The sales order quantity and order values have also been shown.

**Table 3.3: Number of Novel Items During Year 2012 and 2013**

Collection name	AW	SS	Total	AW	SS	Total	Comparison
Month period	July 2012	January 2013	SKUs	July 2013	January 2014	SKUs	total SKUs (%)
<b>Number of SKUs</b>	<b>282</b>	<b>256</b>	<b>538</b>	<b>157</b>	<b>160</b>	<b>317</b>	-69.72
Earring	80	75	155	60	70	130	
Necklace	95	80	175	35	25	60	
Ring	85	60	145	20	15	35	
Bangle and Bracelet	22	41	63	42	50	92	

Source: MGT Company data

Note: AW means Autumn Winter; and SS means Spring Summer.

Total SKUs quantity in 2012 compared with 2013 is more than 69% because of the decelerated economic climate in Europe.



**Table 3.4: Sale Order Value Comparison During Year 2012 and 2013**

Million THB

Period	Collection name	Total Quantity (PCE)	Sales order Value
July 2012	AW12	52,436	39.5
January 2013	SS13	38,619	20.5
July 2013	AW13	44,941	23.2
January 2014	SS14	20,236	10.9
		Total Amount	94.1

Source: MGT Company data

Note: AW means Autumn Winter; and SS means Spring Summer.

The table 3.4 shows the amount of sales during 2012 and 2013. The value has decreased due to the economic slowdown.

The number of deliveries and late deliveries are reported in Table 3.5 and Table 3.6 as follows:

**Table 3.5: Delivery Performance Report in Year 2012 and 2013**

Million THB

Period	Collection	Total Delivery Quantity (PCE)	Total values	Delivery delayed (PCE)	Total Value of delivery delayed	Percentage of delivery delayed	Loss Value
July 2012	AW12	39,064	28.27	13,372	11.30	34.23%	39.96%
January 2013	SS13	30,211	15.00	8,408	5.53	27.83%	36.84%
July 2013	AW13	25,141	13.16	19,800	10.10	78.76%	76.76%
January 2014	SS14	12,194	6.33	8,042	4.64	65.95%	73.36%

Source: MGT Company Data

Note: AW means Autumn Winter; and SS means Spring Summer.

The data shown in Table 3.5 is the number of delivery reports from January to December 2012 and 2013. The total orders and late deliveries are shown for each collection and the percentage of late deliveries in 2013 increased from 65% to 78% due to the flooding situation in Thailand. The company could not deliver the goods on time. Then, the percentage of loss value was compared between the amount of total deliveries and the amount of late deliveries was also indicated.

**Table 3.6: The Penalty Fee from Supplier in Year 2012 and 2013**

Period	Collection name	Penalty fee
		(THB)
July 2012	AW12	1,100,000
January 2013	SS13	553,000
July 2013	AW13	1,010,000
January 2014	SS14	464,000
Amount (THB)		3,127,000

Source: MGT Accounting Department

Table 3.6 shows the amount of late deliveries in each collection. The penalty fee is calculated by 10% of the total amount of each collection. The total penalty cost is about 3.1 million baht and this cost was distributed in each collection by different values. It depends on how many quantities of components are used in each collection.

### 3.2.1 Process Mapping

The work flow is able to show clearly the responsibility of each function in the organization. The diagram is shown in Figure 3.3 and the explanation is shown in the following steps:

Step 1: Marketing selects stock keeping units (SKU) which are going to launch for a new collection based on the results of research from the global market plus fashionable trends. Then, the marketing provides technical drawings, and indicates color and shapes of each SKU to the product development team. However, the product development team could not be involved in this process as it depends on marketing to make decisions.

Step 2: Product development receives technical drawings of each SKU to makes a mock up sample to marketing for approval. The whole lead time is approximate 12-14 weeks. For each style, the first mock up sample is sent to the marketing department, the marketing department usually gives comments and revises some details. Then, the new mock up sample must be

done and resent to marketing. For some designs, revisions are done in many rounds. Multiple revisions does not only affect the product development team but also affects costing and procurement because the detailed revision information is communicated only between the product development and marketing teams. Other involved departments such as costing, procurement, etc. do continue their regular work to make the material list and BOM based on the first, non-updated design. This leaved an un-updated BOM in the system and procurement which remains an inaccurate material list, and releasing an incorrect components list to suppliers on a weekly basis.

Step 3: The data of the BOM are handed over to the costing department in order to maintain costs, material usage and information to the SAP system. All systems are able to generate lists for other purposes. For example, procurement is able to use the data to set up new vendors, generate total requirements in order to catch up the total SKUs of the new collection.

Step 4: In the 4-week period in advance before the collection is released, marketing must agree with the final design of the new item to sell in the next collection. The updated designs are sent to the distribution center to place the orders for the new product items. The list of all new SKUs is then sent to procurement in order to purchase components in advance for small lot order quantities for the new collection.

Step 5: Procurement generates a BOM list from the SAP system and starts to calculate demand of components manually.

Step 6: Procurement issues the purchasing orders in advance as the approved list of suppliers. For this stage, procurement can place the order once a week and release orders 4 times. The reason to manually order 1 month in advance is because the product development has not finished updating the team when the mock up sample that was changed or revised from the customer.

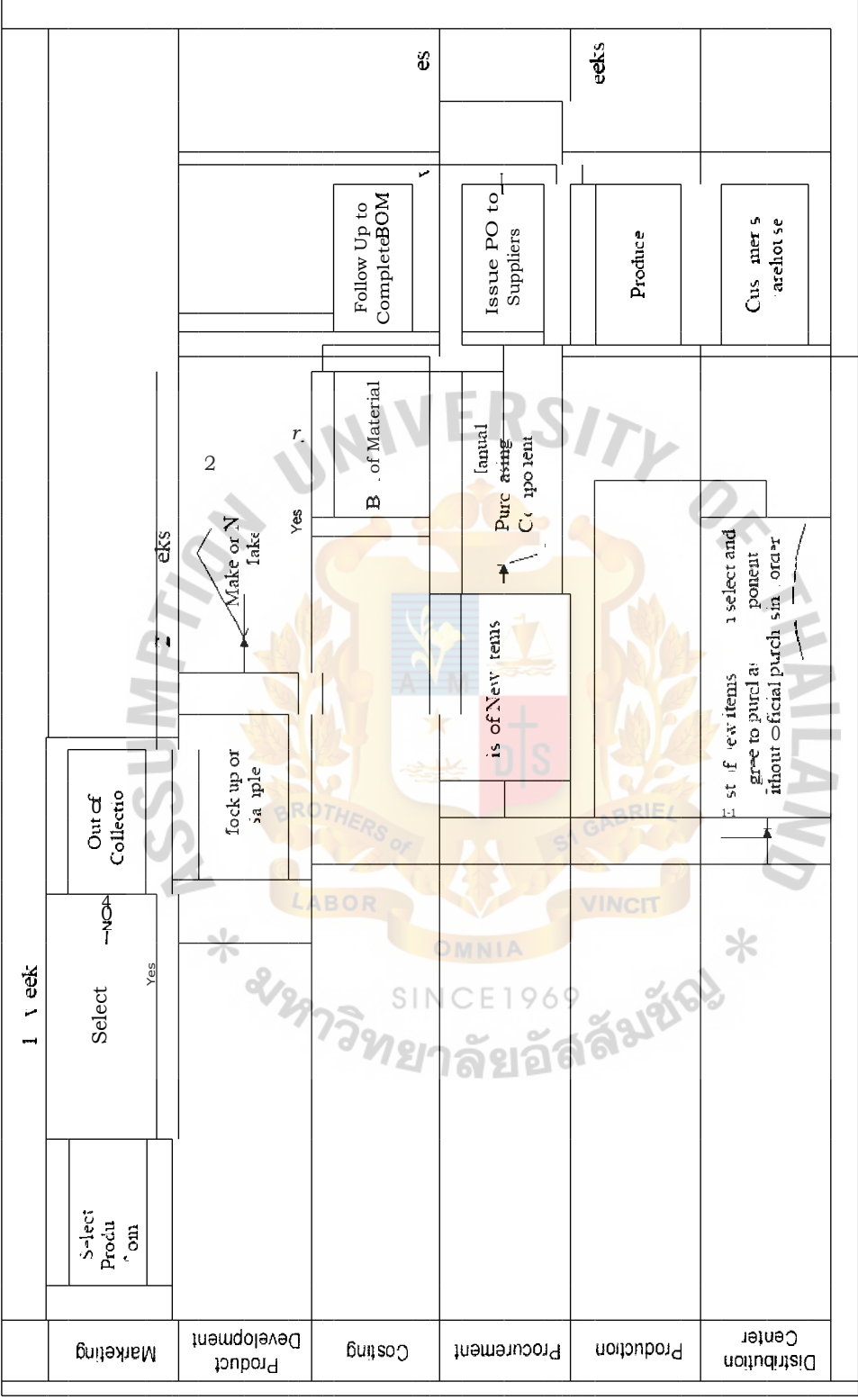
Step 7: Suppliers confirm the delivery date of the manufacturer.

Step 8: Inspection of the incoming materials to check the quality of components and post to stock when the quality of component can be reached.

Step 9: Production process takes a lead time of 4-6 weeks starting from casting and transforming the materials to finish good products.

Step 10: Delivering the finished goods of the new collection to customers or the distribution centers by air freight.





Source: Author



**Table 3.7: Production Lead Time**

No	Activities	Person in Charge	Lead Time (week)	Percent with Total Lead Time
1	Selecting stock keeping unit which is suitable items for launching of new collection.	Marketing	1	3%
2	Making the mock up or sample to marketing for approval.	Product development	14	<b>47%</b>
3	Update BOM to SAP system.	Product development Costing	2	<b>7%</b>
4	Customer (Distribution Center) provides total items which are approve by marketing.	Distribution Center Procurement	1	3%
5	Purchasing orders in advance before collection released.	Procurement	4	<b>13%</b>
6	Supplier confirms the delivery date of manufacturer.	Procurement	1	3%
7	Production process.	Production	6	<b>20%</b>
8	Delivery shipment to customers (Distribution Center)	Logistic	1	3%
<b>Total Lead time (week)</b>			<b>30</b>	

Source: Author

Table 3.7 explains the lead time of each activity in the production process, even though MGT products are seasonally designed, the lead time of each activity does not change. The above table shows the process by activities starting from selecting possible items for launching new collections through delivery of the goods to customer of each activity has a specific lead time and each is in the last column and drawn with the percentage of what is the comparison between lead time of each process and the total lead time. The outcomes of this step are important in order for the researcher to identify what is the bottle neck or what takes the longest lead time so, the making of a mock up or sample spends 47% of the lead time from the total lead time.

### 3.2.2 Fishbone Analysis

This tool is useful to analyze the root cause of the long lead time during the product development process. The root causes can be kept or improved by using business process redesign in order to bring efficiency in the product development process. In this study the researcher has tried to find the reasons why the company faced orders for raw materials by using Fishbone Analysis.

Referring to the data analysis of delivery performance in Table 3.5, the data shows the delivery delay during 2012 and 2013. The company lost profit due to this issue. The cause is mainly from the BOM changing. According to the changes and loss of profit to the company, this research will use fishbone analysis to analyze the root cause.

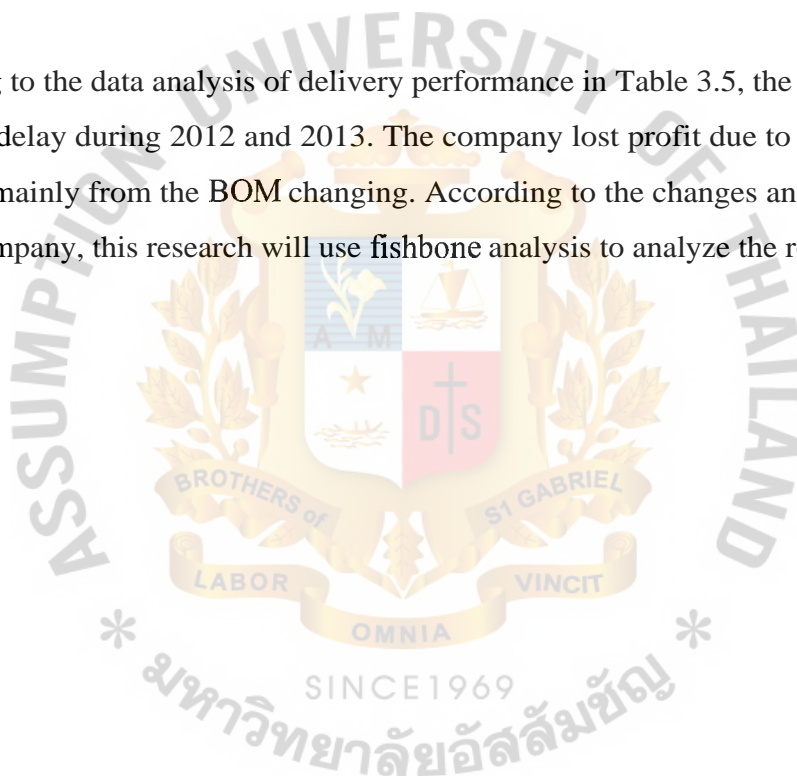
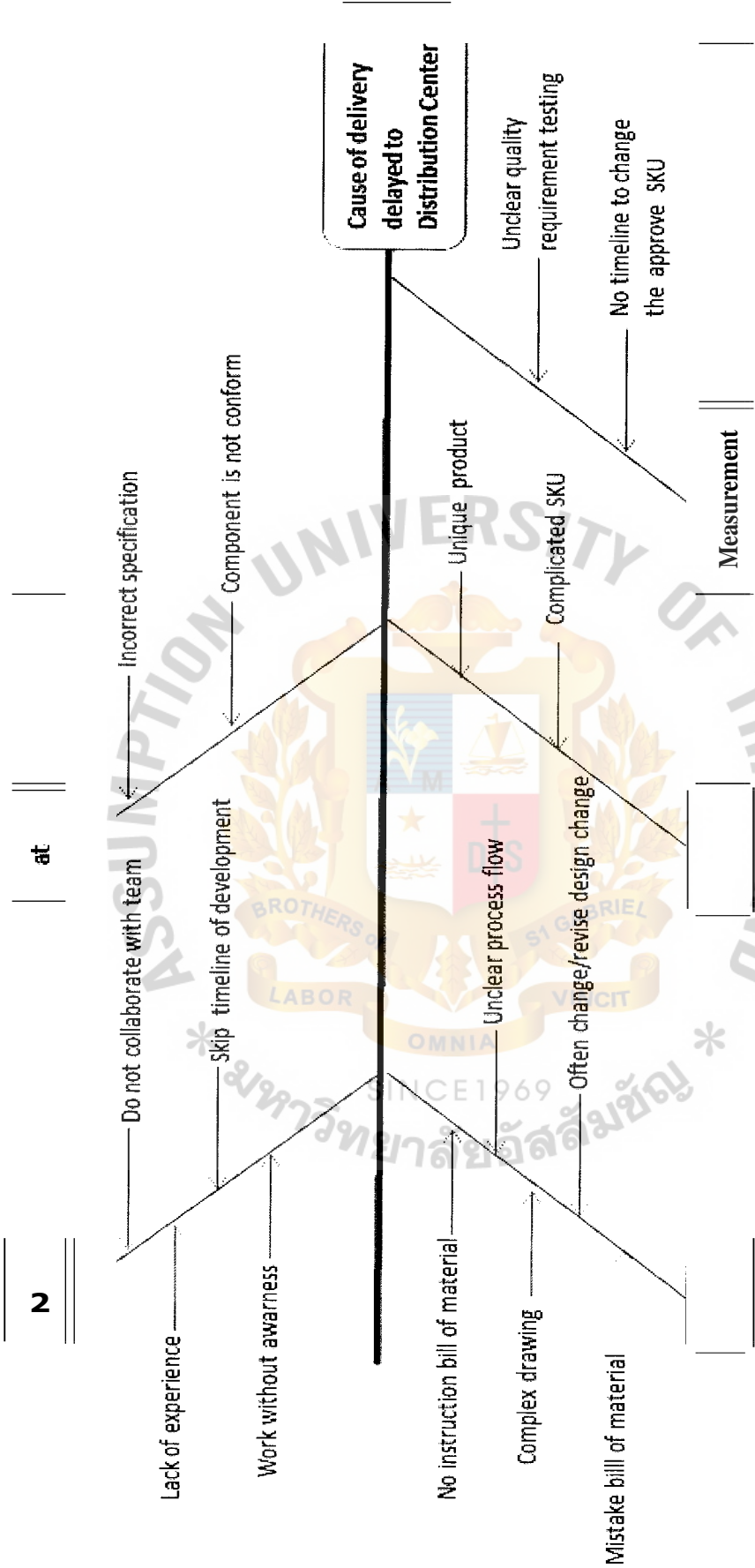


Figure 3.4: Summary on The Possible Cause- Effect on Delivery Delay to Distribution Center



Referring, to the Figure 3.4, the fishbone diagram focuses mainly on five criteria; Man, Material, Method, Machine, and Measurement. The following root causes are analyzed below:

#### 1. Man

- Lack of experience.
- Works without awareness.
- No collaboration. The updated information has not been shared to the team.
- Skips timeline of development. There are no fix timelines depending on customer's request.

#### 2. Material

- Incorrect specification. The specification is not completed to procurement and it will spend a lot of effort to translate and revise the specifications to suppliers.
- Component does not conform. The component is not correct according to the quality requirement. Some metal is restricted to the use in jewelry.

#### 3. Method

- No instructions to set up the BOM. There are no clear instructions and they often let the customer change while the items are approved.
- Complex drawing. The drawing is not clear and there are not procedures for how to write and draw to suppliers.
- Unclear process flow. There are no working instructions. Manual work has been done.
- Often change. Customers often change the model and most of the time, the items are approved.
- Mistakes in the BOM. The components always change when marketing needs to revise the finished goods.

#### 4. Machine

- Unique products. The components are always special due to the fashion design, so it shows the component has special appearance and or function.
- Complicated SKU. The sample depends on the marketing demand and the company needs to invent the tools by themselves. It will spend a lot of effort and time consumption.

## 5. Measurement

- Unclear quality requirement testing. There is no drawing of tested jewelry clearly.
- No timeline to approve SKU (no changing). There is no agreement between customers and product development to fix the timeline of the sample approval or development. The company often found that the sample has been changed after the sample has already been delivered to the distribution center.

A summary on the possible causes and effects in the delivery delay to the distribution center is shown in Figure 3.4. The factors were agreed into 5 types: Man, Method, Material, Machine and Measurement. The diagram contains 2 main parts 1) the cause placed on the fish bone; 2) the problem or effect place on the fish head.

### 3.3 Application of Business Process Redesign

Business process redesign (BPR) is planned in this study in order to improve the lead time of new product development. The concept of business process redesign (BPR) analyzed the processes and shows which processes have to be improved which is described as follows:

Step 1: Interviewing mainly 3 managers of new product development and collecting process details and time is required of each process.

Step 2: Drawing new product development process flow charts and connecting all guidelines and coordination between departments.

Step 3: According to the process flow the weak points have been selected and used as an opportunity to make an improvement.

Step 4: Design improvements plan to achieve "as-is" to a stage of "to be".

Step 5: Draw up the flow chart of new product development process and short lead time of it.

Regarding the data presented in the data analysis and Fishbone diagram, the main cause of the long production lead time is on the mock up and sample making in the product development stage. Thus, this process would be redesigned. However, the whole work



flow in product development, costing and procurement stages would also be redesigned to fit well with the new product development design. The redesigns would be emphasized on:

To reduce lead time during product development since this is a critical process that takes the longest lead time and duplicates jobs when the mock up sample has been made.

To reduce the redundant activities after the changes in the product development stage.

To inform suppliers in advance about their material orders. The process is going to alert suppliers about new orders and they can reserve the capacity right away. After new product design is complete, procurement is able to place orders to suppliers.

This study has focused on the long lead time of the process. The work flow is considered in order to reduce some non-value added activities by using business process redesign as each process has shown the lead-time, therefore, the business process redesign can be implemented in the current process, and as a result the process can be made shorter than what is currently in place. In addition, the communication through functions has to be analyzed for accuracy.

Referring to the current product development process, the product development spends approximately 14 weeks because there are some changes in ideas or revising the technical drawings during this process. In addition, the mock up sample process is still manual and key materials are ordered one by one to pass the sample order to production.

There are two main points which the business process redesign may need to be implemented in order to reduce lead time and increase purchasing accuracy. Firstly, the new business process redesigns focus on manual work between marketing and product development. The marketing team should pass information of new product designs through the system. The product development team is able to convert this information automatically and pass the sample information to production.

The second is about how to reduce the product development lead time from 12-14 weeks to be 2-4 weeks. The redesign of the system and working procedures are needed.

The meeting among product development, costing and procurement teams is needed in order to introduce "As is" and "To be" of new business process redesign. The team can share the ideas during the meeting. The timeline and measurement of the new business process redesign will be implemented in order to improve delivery performance in the next collection.

### **3.4 Verification of the New Design of the Production Process**

After revising the working system, flow, and working procedures based on the BPR concepts, the potential improvement of the production lead time and reduction of the penalty fees from the suppliers after shortening the process of new collection, the MGT Company does not have to pay this cost and the smooth flow of all people involved are expected. The success of the new business process redesign can be illustrated if these three issues are proven to be better. Thus, the production lead, the penalty fee, and detailed work flows of the "As is" and the potential outcomes of the "To be" stages will be compared.

### **3.5 Summary**

This chapter related to the methodology which considers all the steps and lead-time of a new product. The data has been collected from business process, responsible persons, documentation, and observations. The data will be used to analyze and apply business process redesign in order to increase the values and efficiency. The diagram then is able to show outcomes and expectations to compare with an as-is business and review where the critical process or time intensive activities are. Then the redesign process can reduce redundancy lead time by using cross functional teams in the product development process. The business process redesign will increase

competitiveness to the product development of a company in order to keep short the lead time to reach customers demand.



## CHAPTER IV

### PRESENTATION AND CRITICAL DISCUSSION OF RESULTS

The prior chapter indicated that, this study had applied business process redesign concepts to focus on how to reduce the lead time of product development process of a new collection. The data were collected from in-depth interviews, observations and document reviews. These data were, then, analyzed to identify the process mapping. This chapter presents the results, which are separated into six sections. First is the result of the observation, document reviews and the interviews with three main managers who are involved with new product development process of new collections. The second section shows the as-is process. The product development of process flow charts with the lead time and bottle neck is also proposed in this section. Third, the improvement plan of the "To be" process is presented. Next, the redesign of product development process is presented followed by the new work flow of product development process for new collection. Lastly, the possible outcomes of the new product development process for the new collection are discussed.

#### 4.1 Data Collection Results

##### 4.1.1 In-depth Interview Results

In order to identify the existing flow of new product development processes of a new collection, in-depth interviews were performed. Three main managers i.e. Product Development Manager, Costing Manager and Purchasing Manager, were the targets for interview. The scope of questions is to understand the overall procedure of the development of the new collection. The collaboration among related departments is emphasized in order to understand the nature of information and production process flows as well as working problems between product development processes of a new collection as well. The results of the in-depth interviews are applied to the designs for application to business process redesign. Interview results are shown in Table.4.1.

**Table 4.1 Summary Interview Results**

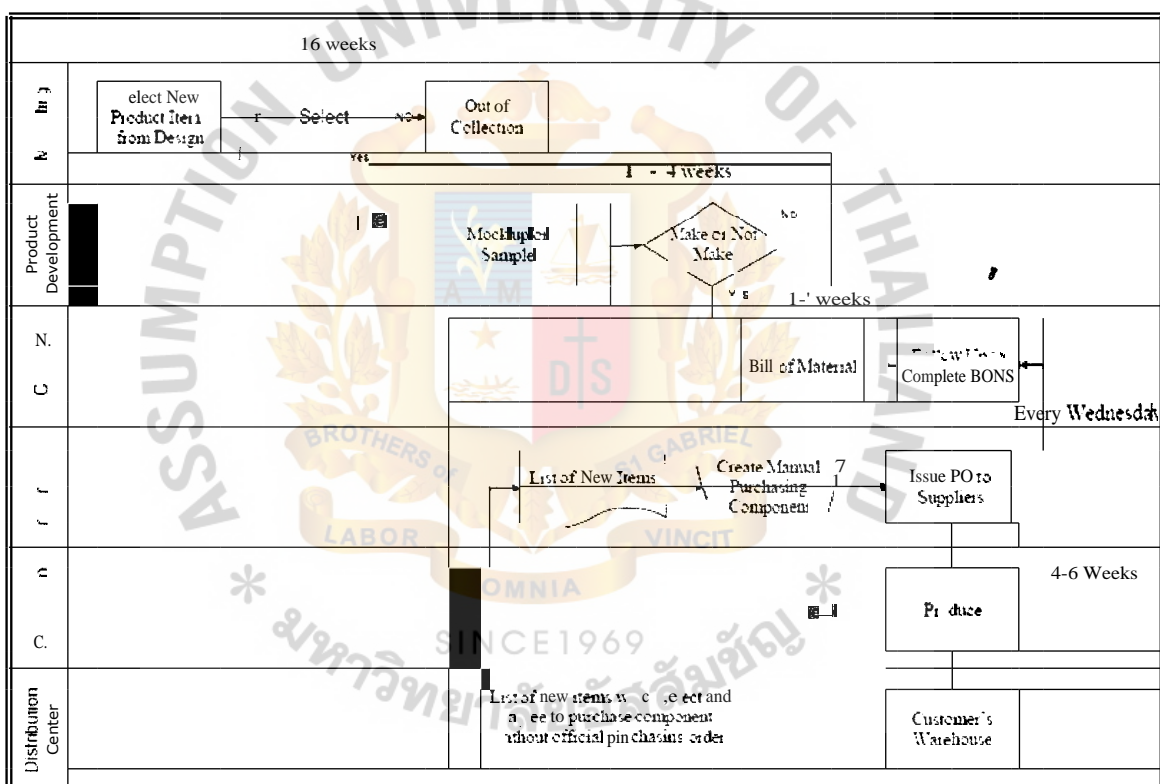
Interview Questions	Development Manager of		
	Product Development	Costing	Procurement
1. What is the main problem during new collection process?	Multiple revision design	BOM is not accurate	<ul style="list-style-type: none"> <li>- BOM is not accurate</li> <li>- Purchase order manually</li> </ul>
2. What do you think the cause and factors of problem are related to?	<ul style="list-style-type: none"> <li>- Skip timeline of development process</li> <li>- Often changed the design</li> </ul>	<ul style="list-style-type: none"> <li>- Do not collaborate with team</li> <li>- No timeline to change the BOM.</li> </ul>	<ul style="list-style-type: none"> <li>- Supplier cannot delivery component on time.</li> <li>- BOM always revise or adjust</li> </ul>
3. How many items needs long lead time more than 14 weeks during mock up and making sample?	Depend on how difficult of SKUs in each collection	-	-
4. Which processes must be focus after reviewing?	Marketing	Product Development	Product Development
5. How many items have been cancelled? (per collection)	10-15 SKUs	10-15 SKUs	10-15 SKUs
6. How many items have incomplete BOM?	More than 50 SKUs	More than 50 SKUs	More than 50 SKUs
7. What is the good process should look like?	<ul style="list-style-type: none"> <li>- Follow the timeline of the development process.</li> <li>- Synchronize information with team member</li> </ul>	<ul style="list-style-type: none"> <li>- Sequence of product development process</li> <li>- Synchronize information with team member</li> </ul>	<ul style="list-style-type: none"> <li>- Accurate Purchase order to supplier</li> <li>- Sequence of product development process</li> <li>- Synchronize information with team member</li> </ul>
8. What can you do to improve the process?	<ul style="list-style-type: none"> <li>- Discuss with Marketing team</li> <li>- Readjusted the product development process</li> </ul>	<ul style="list-style-type: none"> <li>- Collaborate with team in order to align accurate information</li> </ul>	<ul style="list-style-type: none"> <li>- Collaborate with team in order to align accurate information</li> </ul>



#### 4.1.2 Observation Results

The observation can be done in some areas, such as the flow of new product development, process lead time and process mapping. All of these processes can be observed at the MGT Company. An observation method is useful for better understanding of the product development process and synchronizes processes of the new collection. Figure 4.1 shows the process flows identifying from the observation.

**Figure 4.1: Observed Process Flow**



According to Figure 4.1, the outstanding product development process of the new collection is driven by product development team who is design and defines their process. The first problem area is the mock up sample process which is managed by the product development team. The study found that even a mock up sample is done on time but the sample is still delayed since marketing had requested to revise many times even the timeline of sample processes is over. Furthermore, product development process spends about 47% of the total lead time of the new collection

process. The second problem comes from the costing department to the procurement department. In the normal process, costing is transformed from the bill of material (BOM) data to the system and the procurement department took up the bill of material and released orders for the raw materials to suppliers. The procurement department has to place an order manually one time per month in advance. While the mock up sample is still being revised, the product development team did not update new data to the bill of material to system. Therefore, the effect came from the product development still letting marketing change without any limitations and there is no process to update the bill of materials.

#### 4.1.3 Document Review Results

Historical data in the company are considered for detail of the new collection process. Several documents involved relate to departments of the new product development process such as the number of novel products launched and order placement of a new collection as well as the delivery performance reports are also gained. Figure 4.2 shows the loss of sales of the new collection that comes from the delay in the production and delivery.

**Figure 4.2: Loss Values of Sale Order of New Collection**

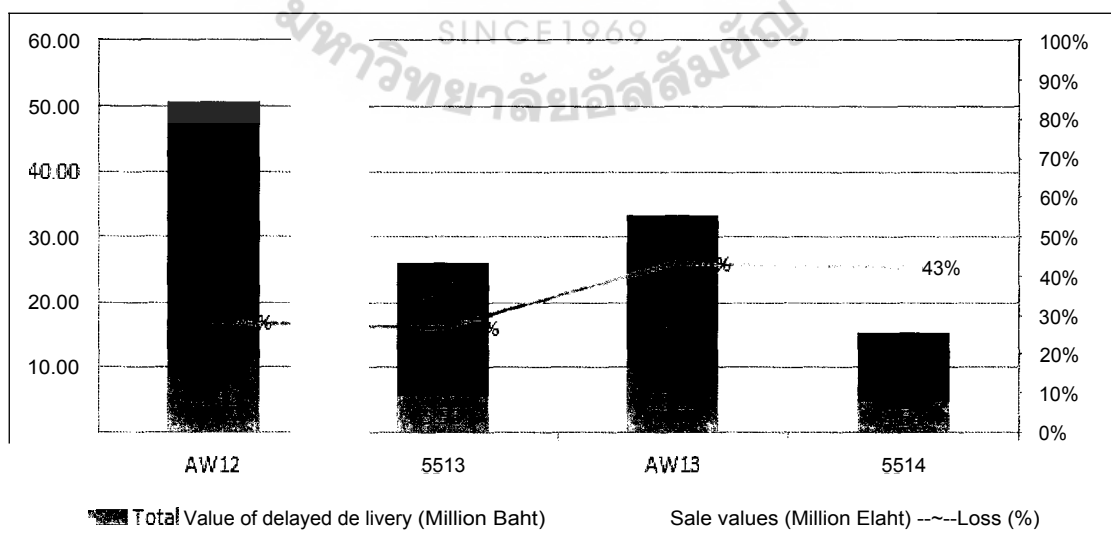
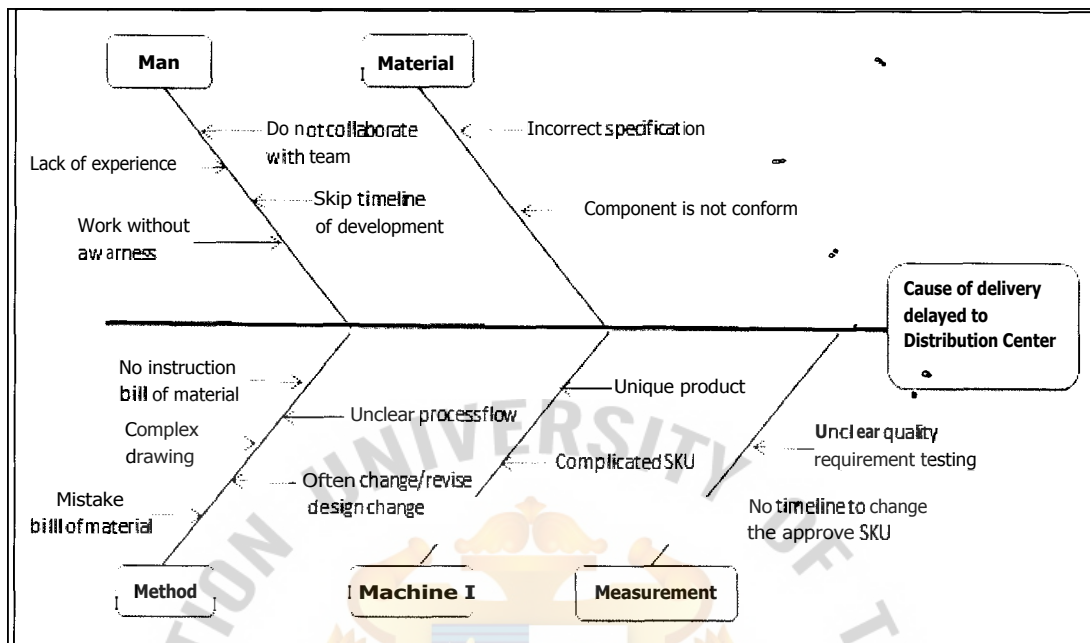


Figure 4.2 shows the value of delayed delivery and declares the value of delayed delivery per collection. The percentage of loss comes from the total delayed delivery values / total on-time delivery values and multiplied by 100 for percentage. For example, in collection AW12 it found that the total delayed value is 11.30 Million Thai baht and total on-time delivery value is 39.50 Million Thai baht. Therefore,  $11.30 / 39.50 * 100$  is equal 29%. The average of loss value of AW12 and SS13 approximately 27%-29% while the AW13 and SS14 collections were approximately 43 %-44%.

The delayed delivery of the new collection stage is selected to study the root cause of what comes up in the new collection is a late launch period by using fishbone analysis to seek the root cause. Next, the researcher found the various factors from interviewing three main managers; Product Development Manager, Costing Manager and Procurement Manager. There are wide causes which might come up for the delayed delivery as shown in Figure 4.3. After analyzing the researcher found the main reason comes from the sequence of steps of the product development department so, the researcher decided to conduct research on how to make sustainable improvements by selecting the most critical processes that have a high impact to MGT Company.

**Figure 4.3: Fishbone Analysis**



#### 4.2 As-is Process Flow Chart of New Collection

The existing process flow chart of new collection and the process can be described in seven steps as follows:

Step 1: Marketing provides SKUs and technical drawings to the product development department of MGT Company.

Step 2: Product development team makes a mock up sample to marketing for approval. In this step product development updates BOM data to costing department in order to maintain finish goods cost, material usage into the system.

Step 3: Marketing confirms the final design of new item to the product development team. Then the product development team passes all information to the costing department.

Step 4: Procurement department retrieves the BOM list from the SAP system and calculates requirements of components manually. Then, they release purchase orders in advance as the approved list of suppliers. In this step the procurement team has to manually purchase orders 1 month in advance to ensure the BOM list which is from product development and costing department updates.

Step 5: After suppliers confirm delivery dates and deliver the components, the MGT waits for the materials to be delivered. Inspection of the incoming materials is performed when material is delivered to MGT Company to check the quality of components and post to stock when the quality has passed the specification.

Step 6: Production process spend a lead time of 4-6 weeks starting from casting and assembly to finished goods of the product.

Step 7: Delivering the finished goods of a new collection to distribution centers or customers by air freight.

The major process of the new collection is divided into two main processes which are design and marketing process, mock up and production process.

The total lead time of a new collection is approximately almost 11 months. This process is not specific to the timeframe to revise or modify the mock up sample between the product development and marketing departments where major process of the new collection. The details can be seen in Figure 4.4 and Table 4.2 as follows.





Table 4.2 As-is New Collection Process Timeline by Activities

No	Process	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8			Month 9	Month 10	Month 11		
		1-4	5-8	9-12	13-16	17-20	21-24	25-28	29	30	31	1 W33-36	3-40	41	42	43
1	Design and Marketing															
2	Product Development															
3	Costing															
4	Procurement															
5	Distribution Center															
6	Production															
7	Delivery															
Lead time		16 weeks				14 weeks				12 weeks			4 weeks			1-2 weeks

Remark: “W1, W2, W3,.... W44” refer to “Week1, Week2, Week3,.... Week44

Table 4.2 shows the timeline of new collection by weekly basis and the detail of activities is covered.

The details of each stage are discussed stage by stage from the first stage i.e. design and marketing to the last stage which is delivering of the goods. The details are as follows:

#### 4.2.1 Design & Marketing

New collection process starts with first step from when the marketing team has surveyed and analyzed the feedback from previous collections and finalized the creative ideas and characteristics of the product and-concept. The process starts with the marketing team at week one for collecting the results of the research from global markets plus fashionable trends and history of sales orders from previous collections. They initiate an idea and concept of finish goods products as well as product feather is important process since the design will determine future sales from the market. The time is needed and out of control for the design of products and practically it takes approximately eight weeks but actually it depends on their creative ideas. Therefore, this process is unpredictable and difficult to fix the lead time. Then, they select a components list based on active materials of current suppliers. This information is passed to the product development department of MGT. Company. The total lead time of Marketing is shown in Table 4.3:

**Table 4.3: As-is New Collection Process – Design and Marketing**

Stage 1: Process Activities	Month1				Month2				Month3				Month4			
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Product Design	x	x	x	x	x	X	x	x	x	x	x	x	X	X	x	x
Survey and Data Gathering																
Initiate idea																
Product feather																
Selecting material lists																
Select SKUs																

Remarks: the person in-charge is Marketing Department

The sequence of Marketing is one of most difficult points of the new product development process of new collections. The process always requires time. Shortening the lead time of this stage is not a good position since the selecting of the new products has a big impact on the sales volume of the company.

#### 4.2.2 Product Development

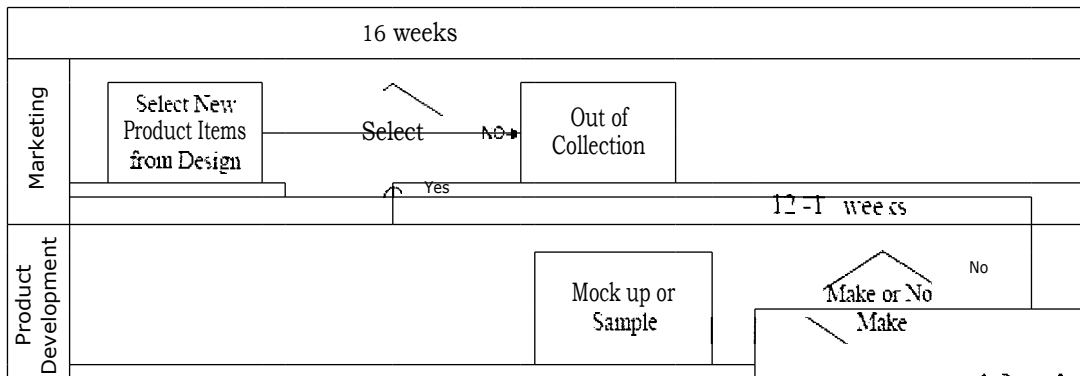
To launch the new products, it requires getting an approval from marketing. The process of product development starts from week seventeen after the marketing team has decided ideas of the shape and concept ,.with new designs. The product development is responsible for this process. After getting information from the marketing team they look into technical drawings and design the approached to make mock ups and samples which are most likely virtual products as the markets need. Then, the mock up sample is made and when the mock up process has finished they have to indicate work instructions for production in order to make the record of the process time and manual work for workers as well. Lastly, the first mock up sample is submitted to marketing. The total lead time is shown in Table 4.4 as follows:

**Table 4.4: As-is New Collection Process – Product Development**

Stage 2: Process Activities	Month5				Month6				Month?				Month8	
	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	W27	W28	W29	W30
Mock up Process	x	x	x	x	x	x	x	x	x	x	x	X	x	X
Design, manufacturing														
Mock up the sample														
Revise Mock up > 6 times														

Remarks: the person in-charge is Product Development Department

**Figure 4.5: Possible Areas for Improvement in the Product Development Stage**



This step of the product development process is quite complicated since it requires the first mock up sample to be sent to the Marketing Department at the headquarters. Marketing practically gives the comments and revises some details. Then the new mock up sample must be remade and resent to marketing repeatedly until all details are satisfactory. Then, the production process begins after all details are approved by the headquarters' marketing department. The multiple revisions are influenced by MGT Company in terms of costing and procurement process as they are required from the BOM list from Product Development. To shorten the lead time of this process is interesting. Although it is a really important process, there are some procedural schedules that can be redesigned. The multiple revisions have been finished beforehand. Then, the BOM list is passed to costing and procurement department is accurate. This process can be done in parallel with the original process. The results of the analysis can make the process quicker and more accurate before passing to the next process. The new process redesign will be discussed in the "To-be" stage.

#### 4.2.3 Costing and Procurement

The process of costing and procurement are synchronizing information because the product development team hands over the data that relates with finish products to the costing department. The data includes the raw material list, finish goods target price. Then, this information from the costing team is used to calculated the cost of finish products or cost of raw materials. After that system is calculated the requirements are

based on finish goods detail. Lastly, procurement is able to generate data for other proposes. For instance creating requirements of whole items of a new collection, creating new supplier lists in order for the company to reserve material with the supplier and get components to support production to produce and launch the new collection on time. The total lead time of both departments is shown in Table.4.5.

**Table 4.5: As-is New Collection Process – Costing and Procurement**

Stage	Process Activities	Month8				Month9			
		W31	W32	W33	W34	W35	W36	W37	W38
3	Calculation total cost	X	X	X	X	X	X	X	X
	- Update BOM list								
	- Calculate cost of finish goods								
	- Calculate finish goods price								
4	Purchasing Material	X	X	X	X	X	X	X	X
	- Upload BOM list								
	- Distribution Center confirms for the material list								
	- Manual purchase order								

Remarks: The person in-charge for Stage 3 is Costing Department.

for Stage 4 is Procurement Department

In the process of the procurement department they retrieve the component lists from the SAP system and release purchase orders in 4 weeks periodically before the collection release since the marketing is finalizing the design of new items within 4 weeks while the procurement department obtained the list of components from the distribution center.

During the steps of the procurement department they must be place the order manually since the product development has not updated accurate information to the team when the mock up sample was revised and changed from the marketing department. From above, it affects procurement when they revise, modify or cancel to suppliers and come up with penalty costs from suppliers as mentioned in chapter 3.



#### 4.2.4 Production and Logistic

The process of production and logistics starts after the components arrive at the company and are passed through the incoming inspection process. Then, the production feed total materials into the production base on work instruction from the product development department. The lead time is approximately 4-6 weeks and it depends on how difficult the process of each SKU is. Lastly, once the production is transformed to finish products then they deliver the goods to the distribution center (customer) by Air freight.

**Table 4.6: As-is New Collection Process – Production and Logistic**

Stage	Process Activities	Month9		Month10				Month 11	
		W37	W38	W39	W40	W41	W42	W43	W44
5	Production run	X	X	X	X	X	X	X	X
	- Reserve production schedule								
	- Production run								
	- QC								
6	Delivery	X	X	X	X	X	X	X	X
	- Packing and Delivery goods								

Remarks: The person in-charge for Stage 5 is Production Department

for Stage 6 is Logistics Department

This process is quite fixed and remains the lead time since the company did not find the problem during the production process because they are assembled at the base on work instructions, let's say it's quite a smooth process. The process is unnecessary to redesign.

#### 4.3 "To be" Process of New Collection

The total lead time of the existing process of new product development is approximately 44 weeks where the product development process takes at least 14 weeks which is around 47% of total lead time, The product development department

should emphasize to make an improvement in the redesign process. The redesign of the product development process in the "To-be" process is shown in Table 4.7 below:

**Table 4.7 To-be New collection Process – Product Development**

Stage 2: Process Activities	Month5				Month6				Month?				Month8	
	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	W27	W28	W29	W30
Mock up Process	x	x	x	x	X	X	X	x	X	x	x	x	x	X
Design, manufacturing														
Mock up the sample														
Not allow to revise Mock up > 6 times														

#### 4.4 Redesign of Product Development Process

The process of the production development is focused on redesigns. They analyze it because the process takes 14 weeks to proceed in the mock up sample process. MGT Company should find the way to reduce the lead time of the revision procedure which is the cooperation between marketing and product development departments from 14 weeks to 10 weeks. In addition, during the revision period MGT Company should not update the bill of materials until all the items have been approved from marketing.

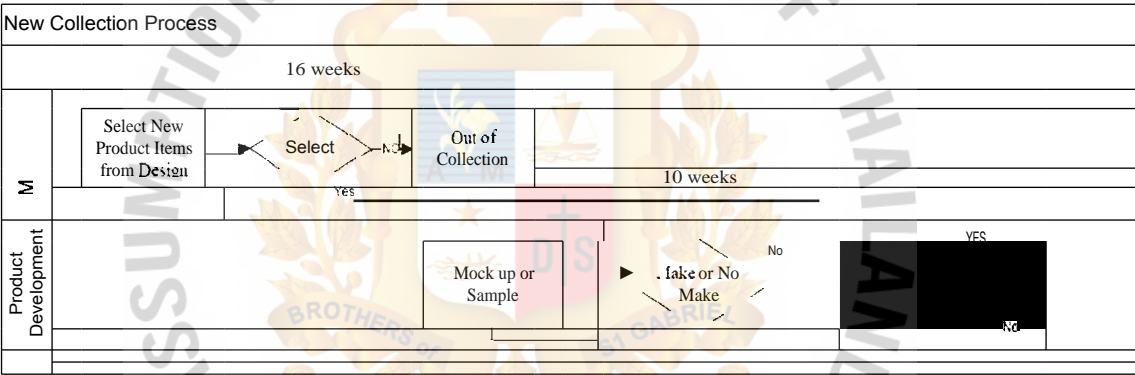
To improve the product development process, it is recommended to control repeating the revision process to reduce the complexity and increase accurate information of the revision change. In this step the Product Development Department should not update the bill of material when the first design is finished in the SAP system for prevent costing and procurement retrieving inaccurate information. They should upload the correct data only when they get the final revision from marketing.

The appropriate revision times should not exceed six times since the total lead time to submit the mock up sample is approximately ten days which includes seven days to remake the product mock-up and three days for air freight transportation of the mock-up. Then, six revisions would take around 60 days or about eight weeks. This

lead time is acceptable since the time is still sufficient for procurement department to release the purchase orders to the suppliers. At the same time, the costing team is able to update the accurate information into the system as well.

The product development has to conduct the meeting with teams to make transition plans to change the new redesign process to present the advantage of new processes and open discussions to get feedback from teams. The new process redesign is shown in Figure 4.6 with below:

**Figure 4.6: To-be New Collection Process – Product Development Process**



#### 4.5 New Work flow of New Product Development Process

After redesigning product development process and readjusting the whole process timeline of all activities in the new product development process, the new work flow is able to shorten lead time approximately 14 weeks to 10 weeks. The new prospective work flow of new collection is shown in Figure 4.7:

Figure 4.7: New Perspective outcome Process Flow of New Collection

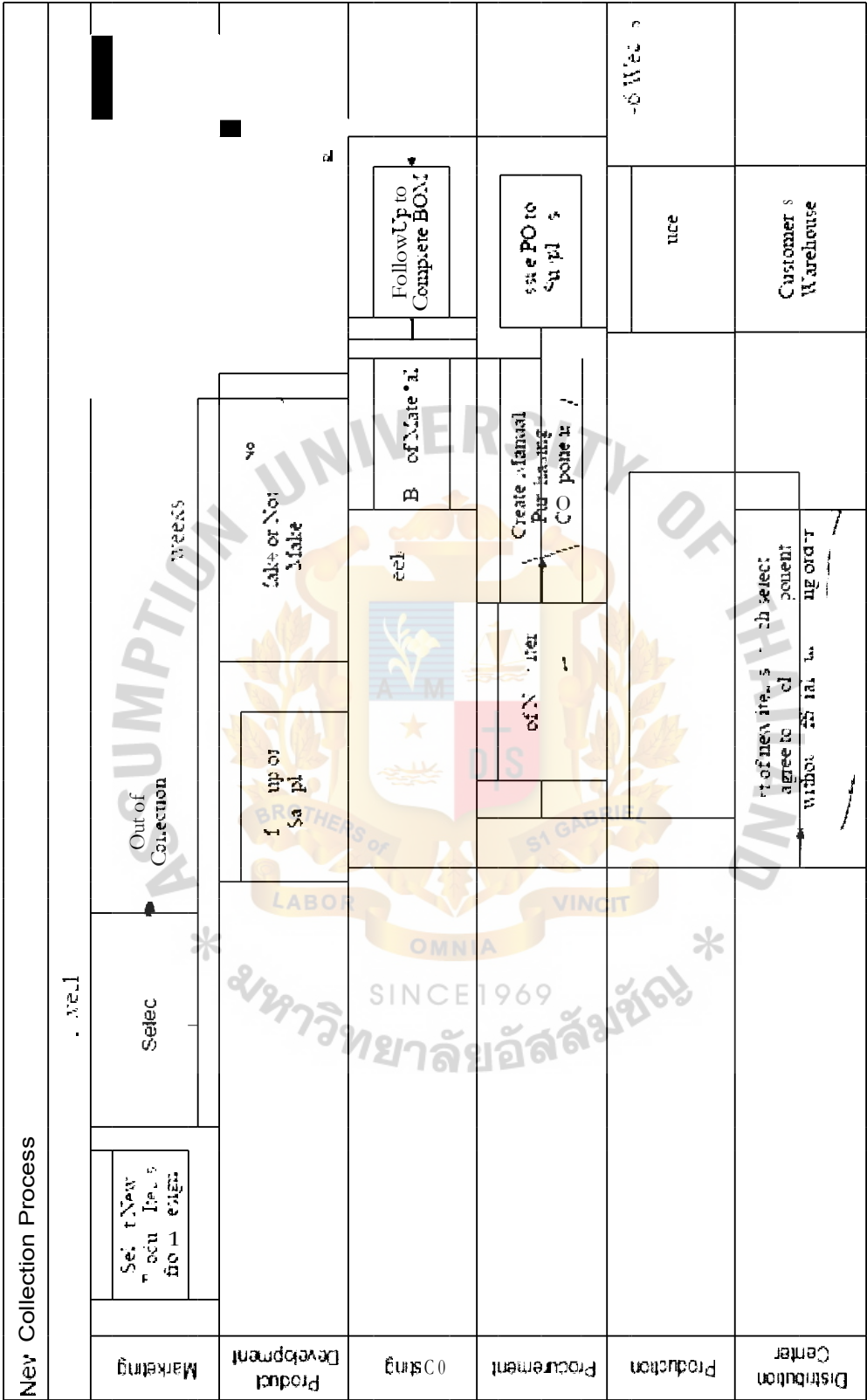


Table 4.8: New Perspective outcome Process Flow of New Collection by Reduced Lead time

No	Process	Month1	Month2	Month3	Month4	Month5	Month6	Month2		Month8			Month9			Month10	Month11	
								W	W	1	2	3	34	35	36	W	W	
1	Design and	-4	W5-8	9-12	3-16	W17-20	W21-24	25	26							W27-30	31	44
2	Product Development																	
3	Costing																	
4	Procurement																	
5	Distribution Center																	
6	Production																	
7	Delivery goods																	
8	Lead time (week)									1	1	1	1	3		46	1	2

Table 4.8 identifies that the whole process of new product development of the new collection. The lead time is decreased by adapting the business process redesign concept. There are several areas that can increased the information accuracy in the key process. The result of decreasing whole lead time of new product development process is 10 weeks from the original 14 weeks. In parallel, Table 4.8 shows the tasks of costing and procurement are obtained to reduce lead time. To identify the root cause of order accuracy for raw materials as well as applying business process redesign to create the new collection process are focused on in this research.

#### 4.6 Expected Outcomes of the New Design

According to the product development process being redesigned during mock up sample process in Table 4.7 and Figure 4.6, the product development process can reduced lead time from 14 weeks to 10 weeks. At the same time, costing and procurement obtain the benefits in terms of BOM having more accurate information as well as the procurement generated purchase order more precisely. The data was shown in Table 4.9.

**Table 4.9: Lead Time Reducing in To-be Process**

Act	Activities	Person in charge	As-is	To-be	Lead Time Reducing (week)
			Lead time (week)	Lead time (week)	
1	Selecting stock keeping unit which is suitable items for launching of new collection.	Marketing	1	1	0
2	Making make mock up sample to Marketing for approval.	Product Development	14	10	4
3	Update bill of material to SAP system	Product Dev Costing	2	1	1
	Distribution Center provide total items which are approve by Marketing	Distribution Center Procurement	1	1	0
5	Purchasing order in advance before collection release	Procurement	4	1	3
6	Suppliers confirm delivery date of manufacturer.	Procurement	1	1	0
7	Production process	Production	6	6	0
8	Delivery shipment to Customer (Distribution Center)	Logistics	1	1	0
		<b>Total Lead time (week)</b>	<b>30</b>	<b>22</b>	<b>27%</b>



After the product development process had been redesigned, the benefits in terms of cost savings from penalty fees which MGT Company paid to suppliers is reduced to 3.1 million baht from 31 million baht of the total value of delivery delayed as shown in Table 4.10.

**Table 4.10: Penalty Fee Reduction**

Collection name	Total Value of delivery delayed (THB)	Penalty fee
		Reduction (TUB)
AW12	11,295,624.00	1,100,000
SS13	5,527,206.00	553,000
AW13	10,100,293.00	1,010,000
SS14	4,640,152.00	464,000
<b>Total (THB)</b>	<b>31 563,275</b>	<b>3,127,000</b>
<b>Penalty Fee Reduction (%)</b>	<b>10%</b>	

#### 4.7 Summary

After the data from the document reviews, observations and in-depth interviews, the whole process of a new collection are collected. The lead time is mapped into a process flow. These processes are readjusted and divided into 2 phases which are the design and marketing process and mock up and production process. The design and marketing process is not considered to redesign because this process is out of control. That means this study is determined on mock up and production process instead. The results of overall processes can reduce lead time.

The research mentions the business process redesign (BPR) concept to make an improvement to the new product development process of the new collection of MGT Company. The new work flow of "To-be" new product development process is shown to prevent action of delayed delivery problems.

## **CHAPTER V**

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

This chapter contains three main parts of the results of using business process redesign in the MGT Company. The first part is the summary of the findings. The second is conclusions. Lastly, theoretical and managerial implications as well as recommendations for this study are presented.

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

According to main research question mentioned in chapter I which is "How would the MGT redesign the process of a new collection?" the description of the findings contained to answer this research question. The MGT Company had delayed delivery to customer as well as paid the penalty fee to suppliers.

This study faced that there are three problem areas which are 1) long lead time of product development process; 2) costing department used inaccurate information from the BOM to calculate the material and finish products price; 3) procurement used incorrect BOM lists and released purchase orders to suppliers. As a result of long lead time of the new collection it caused delayed delivery to customer. The results investigated three problems area and found that the product development stage of the new collection is the key process to redesign. The study suggested the redesign by using business process redesign concept to improve the new product development process of MGT Company as follows:

**5.1.1 Improvement of mock up sample process:** the process of mock up sample was improved to guarantee that a new collection item was launched to the market on time. After interview with main manager of new product development process of new collections, the product development process is an important process which is driven by the core process of the new collection and even submitted the mock up sample in

order to get an approval or prepared BOM list through costing and it will be sent to the procurement department. In this scenario, the new business process redesign concept will specify the accurate BOM once the marketing department has approved it.

#### **5.1.2 Improvement of Costing and release ordering process:**

After the mock up sample process is done the costing and procurement are able to get accurate information in terms of BOM list and use this information to be applied with other proposes faster.

The process mapping is very helpful as it illustrates the overall process flow chart and makes more of an understanding to monitor the bottle neck or critical process. The improvement area is exposed through the process mapping being considered. The mock up sample process is modified by using business process redesign concept.

After investigating the as-is process, making redesign and parallel jobs, whole process lead time of the new product development is decrease by ten weeks.

#### **5.2 Conclusions**

The main research question of this study is "How would the MGT redesign the process of a new collection?" to improve the production delay problems in the product development process of the new collection. The results showed that the company improved delivery lead time of new collection. This effect can be beneficial for MGT Company in terms of a reduction in the penalty fees and achieving on time deliveries.

The business process redesign was shown to be an effective tool to develop the process of product development of the new collection. In this study, the use of business process redesign was applied to reduce the lead time during the mock up sample of MGT Company. With this business process redesign process, the company would obtain benefits from a shortened lead time of the product development process

as well as the relate departments which are costing and procurement departments who also gained benefits.

In this study, the findings illustrate that the MGT Company readjusted to focus on the product development process by using the business process redesign concept. It can solve the problem. This change has an important improvement of lead time reduction in the mock up sample process. Furthermore, the shortened lead time of the new product development would help MGT Company be able to bring more benefits and flexibility to support the highly competitive market.

### **5.3 Theoretical Implications**

The theoretical implication is about the better understanding of the root cause of inaccurate orders for raw materials and production delayed problems by analyzing the existing process of a new collection in order to improve the whole product development process of new collection.

In addition, this research has increased the understanding of the product development process of a new collection in terms of steps for handling the select new items at the marketing and product development stages, procedures to make the mock up sample process better until an approval of items from the marketing team has happened and the main factors to inaccuracy for material cost, material ordering for costing and procurement departments in order to obviously define the main reason to improve the outstanding process and to seek the best sustainable solution of product development process for the company.

This study used the business process redesign methodology to solve the problem of inaccurate orders and production delay of a new collection. From this research, it was indicated that the BPR technique delivers benefits on the improvement of the process lead time of a new collection.

The proposed results of this study could make an improvement in the lead time of a new product development process by applying the business process redesign technique. From this study, redesigning the process leads to making improvements in the product development process. At the same time, business process redesign tries to eliminate multiple revision time as much as possible. The elimination of multiple revision time and redesign would lead to making the improvement of a new collection process in the firm. Therefore, business process redesign is the one technique that can improve the value stream of the company.

#### **5.4 Managerial Implications**

This research aims to understand the production delay problem and expected to identify the root causes of the inaccurate orders for raw materials in a new collection as well as reduce the lead time of new product development process between three departments which are related in the new collection process by using business process redesign (BPR) concepts and investigation of parallel jobs in each process to help reduce the whole process lead time of the new collection of the company.

This study is a summary of the proposed graduate project to solve the delayed delivery to customers in detail. Data collection is executed and the root cause analysis is considered. Seven steps of business process redesign implementation are discussed in more detail with the existing data reality of MGT Company. Then, business process redesign is proposed and the outcome of the outstanding processes with new process is compared. The proposed results show the improvement of the new collection process performance by applying new business process redesign models. Hence, MGT Company from this study can start pilot projects in real small situations to see the productive changes by applying the new business process model. However, the applications of the high participation and collaboration from each department are required. While management's corporation is the key to the success of the project, management needs to coach and benchmark practices and set up the goals and objectives. Then, monitor intimately to assure that each staff operates the project exactly. Otherwise this project will fail.



Reduction of the whole process of a new collection helps MGT Company be able to standardize the new product development process with faster production processes and be more flexible to support fluctuations of market changes. The company can gain increasing sales orders, on time delivery performance and also meet customer satisfaction.

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

This study was proceeded to identify the root causes of the inaccurate orders for raw material and production delay problems in new collections and redesigned the product development process as well as identified possible outcomes of new product development process of the new collections. Hence, the structure of the process may not match with other businesses in different locations, environments and periods of time. Limitations of this study are below:

5.5.1 The study is based on the data of the new product development working flow of MGT Company. The problem and the solution in this study could not be readjusted to the other companies. Moreover, this study proposes the solution in the summary part, it does not implement the concepts in real situation since it is out of the scope of the study.

5.5.2 The study focused only on MGT Company, a jewelry company in Thailand. MGT Company is an international Company, therefore, if it decides to implement the redesign of new collection process the company has to ask for permission from the headquarters in Austria.

Regarding this study, it required a sequence of mock up sample processes to be done beforehand to pass all information through costing and the procurement departments. In this stage asking for collaboration with the marketing team in order to readjust the sample within 6 times to keep launching for the period on time, The company requires



top management between marketing and MGT Company acknowledge the timeframe to revise the mock up sample process.

For further research, the study could focus more on the supplier development process and networks to ensure they are able to supply materials in terms of quality, quantity and on time delivery. The company can gain more benefits such as an increase in efficiency, flexible capacity and continuous improvement of products and services. This approach could help smooth up new collection processes in the future.



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