



REDUCTION OF NEW PRODUCT DEVELOPMENT  
LEAD TIME:  
A CASE OF A SNACK COMPANY

By  
NAPISARA CHOOSANIT

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

September 2011



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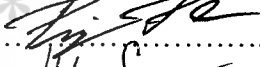

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September 2011

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Reduction of New Product Development Lead Time: A Case of A Snack Company

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I, NAPISARA CHOOSANIT \_\_\_\_\_

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.

REDUCTION OF NEW PRODUCT DEVELOPMENT LEAD TIME: A CASE OF A SNACK COMPANY \_\_\_\_\_

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## ABSTRACT

The snack industry in Thailand has been growing continuously for decades while consumers taste and preference are steadily changing and becoming increasingly sophisticated. A highly competitive snack market in Thailand is very challenging and in order to survive in this market, it is necessary to bring in new excitement through products. Most snack companies keep launching new flavors consecutively with an effort to capture a bigger share the profit market and being updated on consumer taste and preference tendency is necessary To bring new products into the market is faster the better and shorter lead time the new product development means a different being of the first mover or copier. There are a lot of the first mover advantages.

New product development lead time of ABC Thailand Company normally requires six months approximately from design process to delivery to the distribution centers. However, the situation of this high competitive market often drives ABC Thailand Company to push new products into the market faster than the ordinary plan. Therefore ABC Thailand Company is seeking an opportunity to shorten new product development lead time to be faster than six months.

In order to solve this problem, business process redesign (BPR) concept is considered to be applied with the overall process. The study starts from data collection by conducting in-depth interviews, observations and documents review of "as-is" process, analyzes of "as-is" process, plans to redesign the step from "as-is" to be "to-be" stage.

This study found that business process redesign can help reduce new product development lead time apparently by analysis of current process and seek for an opportunity of improvement, Then redesign of a new potential process of the new product development is considered. The result of this study can help ABC Thailand Company to standardize internal new product development processes and maintain competitive advantage afterwards.

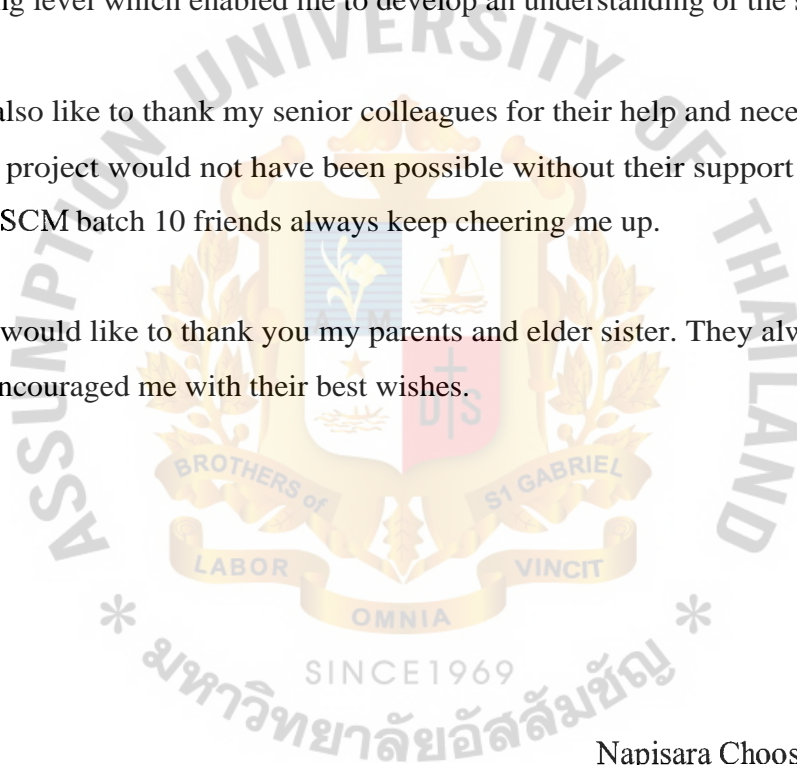
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Napisara Choosanit  
Assumption University  
September 2011



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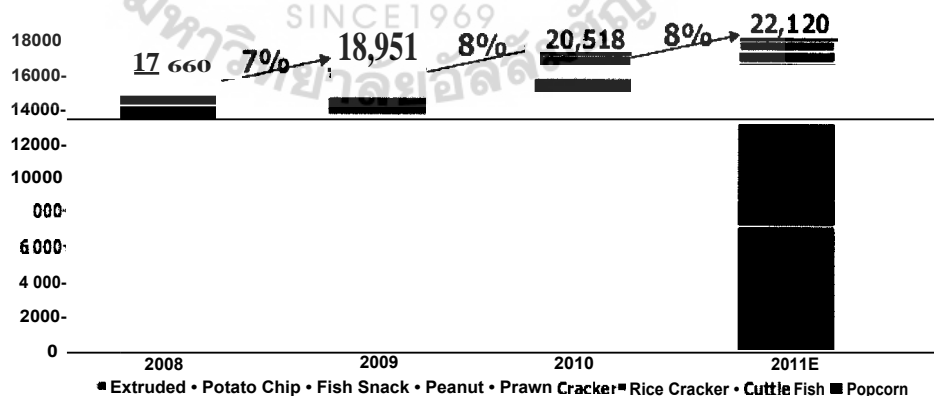
## CHAPTER I

### GENERALITIES OF THE STUDY

The Thai snack market is one of the largest and most implausibly diversified in the Asia-Pacific region. There are approximately over 2,000 different snack brands in regional snack industry which are classified into 5 main segments; extruded snacks, potato chips, fish snacks, peanuts and prawn crackers. There are many producers in this highly competitive market that originate from local and other countries offering a wide range of snack products. Since the last decade, consumer demand, preferences and life style has become very complicated yet all market players are necessary to put solid effort to seek new ways to meet consumer needs.

The snack industry in Thailand has been growing continuously while consumers taste and preferences are steadily changing and becoming increasingly sophisticated. The snack market has a growth rate of 7-8% a year since 2008. In 2011, market size of the snack industry is also forecasted to grow at 8%.

**Figure 1.1 Overview of the snack Industry**



Source: ACNielson as of December 2011

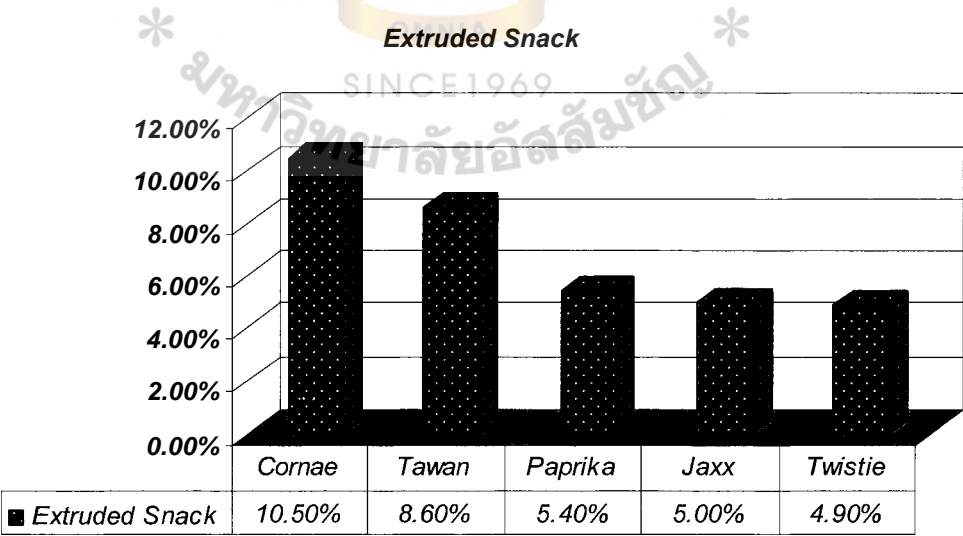
2011 is estimated by the company

From the chart above, Thailand snack market is commonly classified into extruded, potato chips, fish snacks, peanuts, prawn crackers, rice crackers, cuttle fish and popcorn. Considering value of total market, extruded snack covers the biggest market value of the entire snack market at approximately six thousand million baht in the year 2010. Potato chips cover the second rank of the market at a value of approximately slightly lower than six thousand million baht in the year 2010. The rest of the market is covered by fish snacks, peanuts, prawn crackers, rice crackers, cuttle fish and popcorn at approximately eight thousand million baht in the year 2010. This does not include the many snack produced by smaller Thai companies and home-based producers, especially those products which are sold in the rural areas of Thailand. It is practically impossible to track the sales volume of these products. Therefore the actual size of the entire snack market is also difficult to estimate.

The market share of Thailand the snack industry has been classified by segmentation. Key players of each segment are as following:

: Extruded snacks

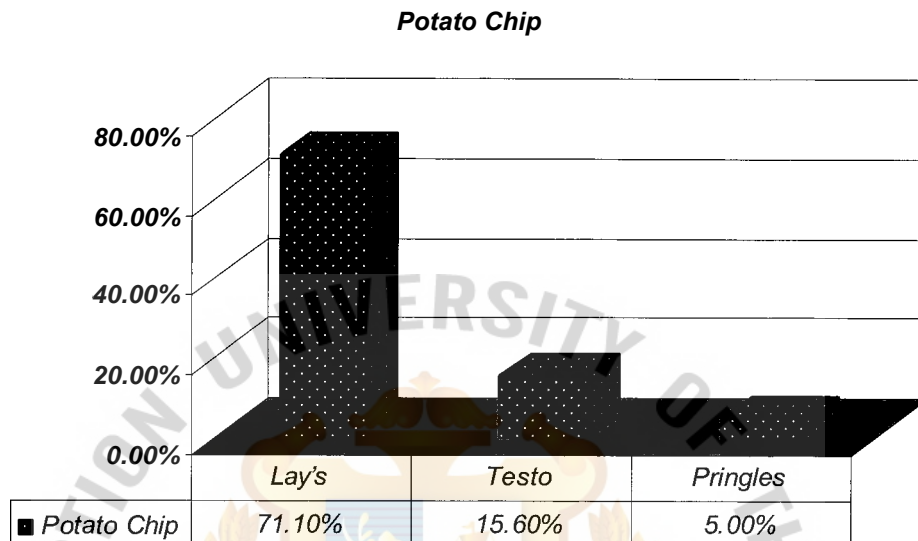
Figure 1.2 Key Market Players by Segments – Extruded Snacks



Source: ACNielson as of December 2011

: Potato chips

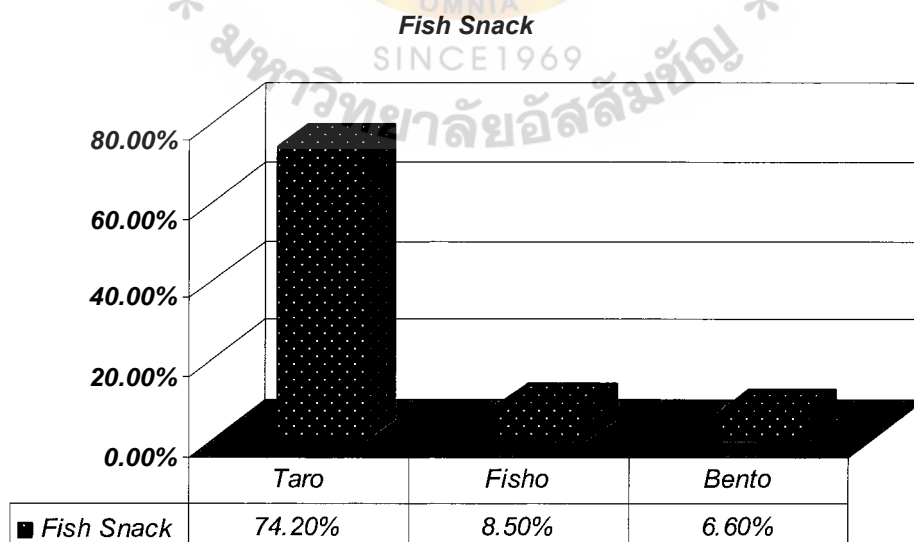
**Figure 1.3 Key Market Players by Segments – Potato Chips**



Source: ACNielson as of December 2011

: Fish snacks

**Figure 1.4 Key Market Players by Segments – Fish Snacks**

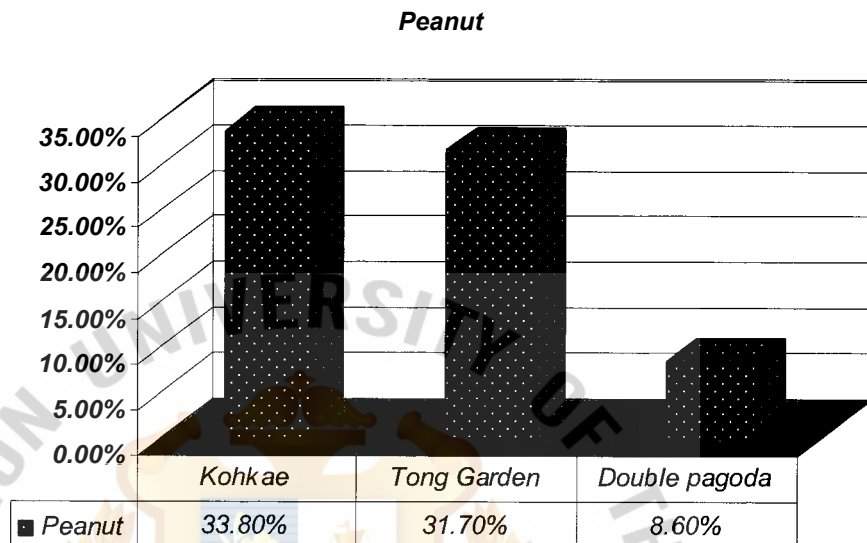


Source: ACNielson as of December 2011



: Peanuts

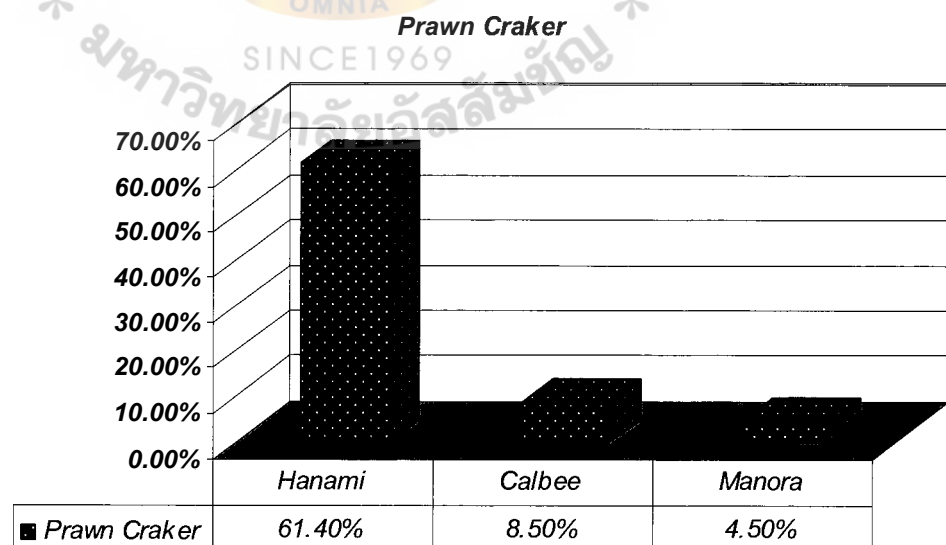
**Figure 1.5 Key Market Players by Segments – Peanuts**



Source: ACNielson as of December 2011

: Prawn Crackers

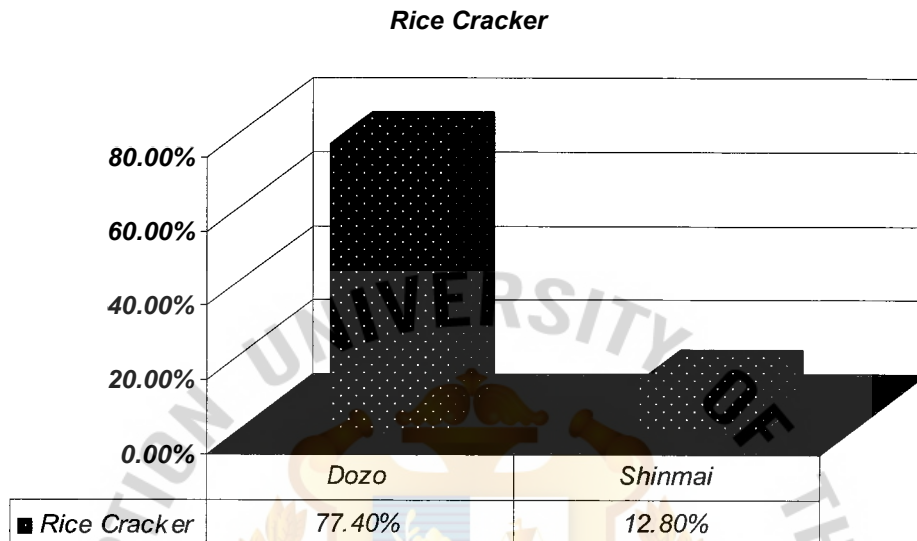
**Figure 1.6 Key Market Players by Segments – Prawn Crackers**



Source: ACNielson as of December 2011

• Rice Crackers

**Figure 1.7 Key Market Players by Segments – Rice Crackers**



Source: ACNielsen as of December 2011

The Thai snack market has strong prospective for growth. The main factors that drive consumers to buy are taste, flavors, price, convenience, ready to eat and healthier choice (Kim, 2011). Many of Thai snack manufacturers believe that consumer taste and preferences have a tendency to change rapidly. Therefore, in order to survive in this market, manufacturers usually develop new products and flavors which launched into the market continuously to offer novelty and more variety for consumer selection.

New and various products help manufacturers to maintain their market share. Thus, large amounts of company expenditure have been invested on research and development for new snack products and flavors. Most snack companies keep launching new flavors consecutively with an effort to capture a bigger share of lucrative markets and be updated on consumer taste and preference tendency. For instance, the most popular flavors in this latest decade were seaweed and wasabi flavored products. Many snack companies decided to have one of these two flavor launched along with a huge marketing budget to push these new products into the market. Consumer responsiveness was very good initially. However, due to the nature

of fast moving consumer goods (FMCG), new flavors enter and go out very quickly, so only the best tested products and flavors can survive in this sensitive market. With no doubt, most successful snack companies invest very much in research and development to come up with the new flavors continuously.

### **1.1 Background of the Study**

ABC Company is a world leader in snacks, food and beverages with a revenue of more than sixty billion US dollars and over two hundred and eighty-five thousand employees around the world. Thailand is considered to be one of company's market units. A number of leading snack food brands include potato base and extruded snacks through consolidated businesses as well as through non-controlled affiliates. Further, either independently or through contracted manufacturers, those brands are sold to independent distributors and retailers.

ABC Thailand seeks an extra market area where consumer demand has not yet been served. The company aims at developing their products and flavors in order to serve consumers' need in the convenient way.

Focusing on ABC Thailand's Snack Division, the snack team aims to provide smart snack choice with a full product line – healthy choice, fun snacks, party snacks, kid snacks, and so much more. Due to a very high competitive snack market in Thailand, ABC Thailand needs to concentrated highly on new products and flavor development as well as marketing tools and consumer research, with a great attempt to lead the market by launching new products or flavors before the competitors.

### **1.2 Statement of Problem**

In order to be leader in Thailand snack business, New Product Development (NPD) is very important. ABC Thailand, snack team realizes that and takes new product development (NPD) into a year plan by setting a number of new products launched to be at an average 15-20 items per year with a proper milestone estimated by seasonal

time periods and product life cycle at the most flexible response according to the market.

New Product Development (NPD) refers to the new way to seek new areas of customer demand where the source of growth and prosperity is. It includes a range of innovation tools, to get more profitability and potentiality in a competitive market. Behind this challenge, collaboration among department of Sales, Marketing, Research and Development, Corporate Affairs, Procurement, Manufacturing, Logistics and Distribution are essential. Furthermore, the flexibility of suppliers is also a part of the company strength. Meantime ABC Thailand's new product development process will need suppliers' technology and knowledge to be a great support behind the company product innovation.

At present, ABC Thailand's new product development schedules are fixed in a yearly business plan. Therefore, each NPD normally requires a lead time of approximately 6 months from design process to product distribution to distribution centers. During long period of development process, the development data can somehow leak out of the company. So, in order to avoid this, all involved parties need to be very careful and keep all data strictly confidential. However, the situation of fast moving competitive market is sensitive to factors. ABC Thailand's must push new products into the market faster and also practically put a pressure to shorten the NPD process down to be less than six months and sometimes push it down to four months eventually. On the other hand, in order to support this rapid change in the marketing strategy, the whole supply chain upstream especially the procurement team needs to be so active. Some ingredients must be delivered by air to support the faster product development process. In order to rush this step, it needs to be in the special urgent orders and these results in an extra service charge back to ABC Thailand. These obviously effect ABC Thailand's internal supply chain function in terms of work load and complicated procurement control. As such, the question is ***"How can ABC Thailand reduce the lead time of new product development processes to be faster than six months?"*** should be focused.



In this study, Business Process Redesign (BPR) is considered to cope with ABC Thailand's situation. It will provide techniques and guidelines to enable the business process redesign in order to reorganize business processes and activities. BPR can help ABC Thailand analyze model of business processes with a view of solutions development for the subsequent stage of redesign.

### **1.3 Research Objectives**

The objectives of this study are:

- 1.3.1 To understand new product development process flow and identify the possible improvement area.
- 1.3.2 To apply business process redesign concept into new product development process in order to shorten lead time of the normal process.

### **1.4 Scope of Research**

ABC Thailand has a wide range of foods products and beverages. However, according to the process of the new product development of beverage product is totally in different way so it will not be included in this study. Meanwhile, ABC Thailand can provide only various snack products. They are potato based and extruded based to the market. So another three snack segments; fish snacks, prawn crackers and peanuts will not be covered. The study will focus on new flavor development process of ABC Thailand snack business and cover all individual brands that are currently offered in the market. Sales & Marketing plan including volume of sales, cost and implementation will not be discussed due to its confidential policy.

### **1.5 Limitations of the Study**

This study aims to make an improvement in the snack new product development process of ABC Thailand only. The data may not reflect or be generalized to other players in the market. Some processes and activities related to government agencies

may not be adjusted since they are out of control area. Moreover, this study may encounter some difficulties since collecting confidential data from R&D and Marketing department is confidential.

### **1.6 Significance of the Study**

The expected benefits from this study are to help ABC Thailand so that the benefits from business process redesign (BPR) concept to new product development process flow can be applied. Redesign the process will help the company to analyze areas of improvement, eliminate wasted time and help parallel task in order to shorten the process time. The study will also help companies to gain more benefits of being the first mover. The sooner the company can find consumer demand and preferences, the sooner the company can gain more revenue. The first mover can gain much more advantages from building consumer excitement, product image and product positioning than those followers. Moreover, the improvement of redesign will result in the company being stronger players in the Thai snack market with higher flexibility response to the market.

### **1.7 Definition of Terms**

**Business Process Redesign (BPR)** Thorough rethinking of all business processes with the main objective of breaking away from old ways of working, and in effect radical redesign of processes to achieve dramatic improvements in critical areas (such as cost, quality, service, and response time).

#### **Extruded Snacks**

Snacks made from other mixed ingredients such as corn, rice, flour, etc to create snack character and shape. Feature outputs are controllable from production.

**Lead time** The amount of time between the placing of an order and the receipt of the goods ordered.

**Potatoes based** Snacks made from fresh potatoes such as potato chips. The output from the production line will be in natural shape and the size cannot be controllable.

**Product development process** Defined steps and tasks such as strategy, marketing plan creation, and commercialization of a new product with an innovative thinking routinely to convert ideas into commercially viable goods or services.

**Product life cycle (PLC)** Marketing theory in which products or brands follow a sequence of stages including: introduction, growth, maturity, and sales decline.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

This chapter presents and reviews the related literature. Topics included are product life cycle theory and business process redesign concept. This chapter discusses product life cycle theory and business process redesign concept for understanding how to reduce process lead time of new product developments in a firm. The details are presented in the following parts.

#### 2.1 Product Life Cycle (PLC)

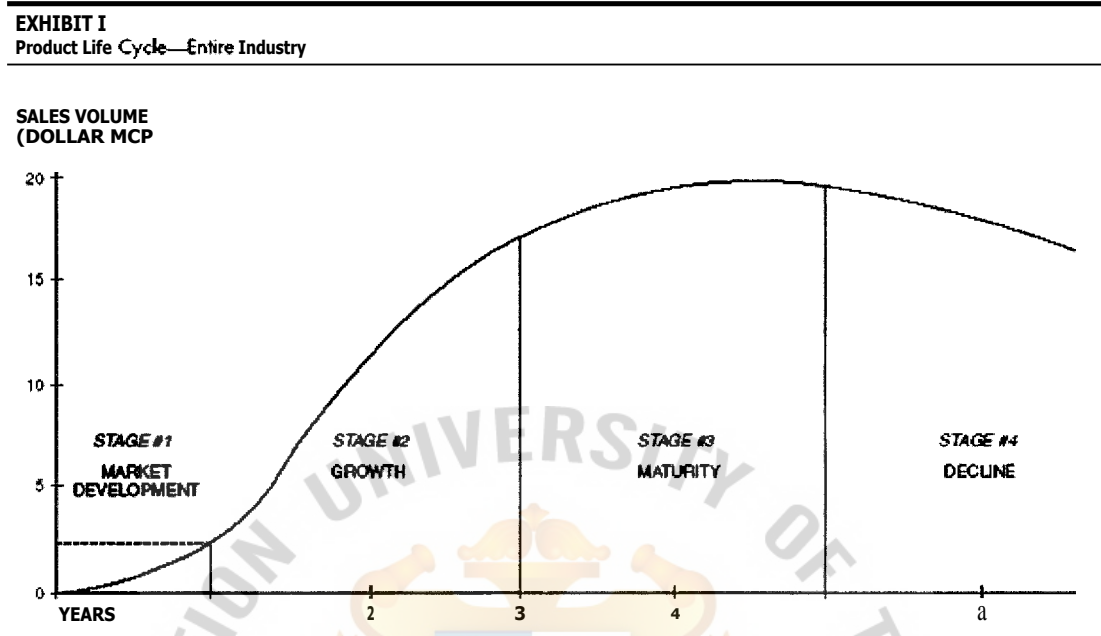
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Most active executive managements are acquainted with product life cycle concept these days. The product life cycle concept will help management to figure out marketing strategic decisions in order to add luster and reliability on company products against the market according to this high competitive situation.

The concept of product life cycle is widely known among other business marketing theories. A lot of people have known or learns about it, but it rarely seems to be applied it in an effective way. The product life cycle concept has been presented in some different way from different writers but most of them have shown it with the same core content which is useful to review briefly in this literature review. The life of a product (Levitt, 1965) being sold in the market from the beginning until it exit the market, is a story of the successful period showing that it has passed through some recognizable stages according to the following order:



**Figure 2.1: Product Life Cycle**



Source: Levitt (1965, p.93)

### Stage 1: Market Development

This is the development stage because it exposes the new product into the market with a challenge of uncertainty and unknowable risk. Most of the writers will include this into introduction stage but it is slightly different as development consume time according to the product complexity while the introduction stage will talk about the start of the sales curve from it was launched into the market. In this literature review, product life cycle stages 1, will be covered from market development until the product being launched into the market. Normally, this stage will be created by demand or be created to serve demand. Development period depends on how complicated of the new product is. The more complicated product, the longer development stage would take. It depends on the consumer needs and competitive situation in the market.

While customer orientation is now the focus, new product development is one of firsthand conditions for sales and margin growth of the company to support new areas of demand. However, all executives and management will need to keep in mind that new product development ravages the cost and often associated with mortality after

launching new products. Doing new product development will cost time, money, create pitfalls and causes more problems to the business but in reality most new products do not have any sort of pattern life cycle curve at all.

### Stage 2: Market Growth

The characteristic of a successful new product is a gradually ascending curve in sales during the market development stage. At some point of this rise where the increasing consumer demand and sales take off, there is a boom. This is starting the growth. By this point, potential competitors will jump into the market after keeping a watch silently during the development stage. Some products of the competitors are an absolute copy from the original while others make improvement on either functions or features, this is called – Brand Differentiation.

In order to fight among those competitors to pursue consumer patronage, this is another attempt of original producer to create consumer perspective. Instead of leading consumer to focus on "try the product" change it to be "prefer the brand". In this stage marketing strategies and manner are necessary.

During the time the consumer acceptance rate increases, it is easy to open new channel of distribution and retail outlets. This will help the product sales volume increases faster than store sales and create an impressive profit opportunity which attracts other competitors.

### Stage 3: Market Maturity

This stage shows the saturation of the market, which means sales volume, grows on par with the population. No need to add more distribution channels during this stage. Meantime price becomes more sensitive and results in a competition towards brand preference which is related to make a difference in the product, customer service and marketing promotion.

Normally, this stage forces the producer to focus on retaining distribution outlets and shelf space. The stage of market development will put an effort on retailers and distributors in helping sell the product but by in the time it reaches the maturity stage, it has often been abated to merchandise displayer and order takers.

During the market maturity stage emphasizes on more effort and on competition is necessary. Producer is forced to attract consumers by price, product differentiation or even both up to the product, service and deals offered. Marketing may create a promotion through packaging and advertising which will help this stage to be passed rapidly in case of fashion or generations with per capita consumption neither increasing nor decreasing and in case of non-fashion products such as beer and steel.

#### Stage 4: Market Decline

After the market maturity stage, the sales volume will gradually drop and diminish and come to an end; it will enter the stage of market decline. In case of maturity and decline the industry will be transformed. Production gets concentrated into fewer hands. Price and margins decreased and consumers get bored. As demand declines, the producer will have an overcapacity to produce so management will find the proper market to survive after industry deluge which can be clearly foreseen. They will initiate a variety of aggressive strategies or tactics and activities.

However, product life cycle theory sometimes leads management to exterminate brands that could be profitable for many more years (Nariman & Sonia, 1976). For instance, many years ago there was a case of a leading brand of floor wax. After a stabilized period of growth, the product sales volume had increased until it hit a plateau. Marketing proposed that increasing in spot television advertising would help recover its momentum. The funds could be better spent in launching a new product.

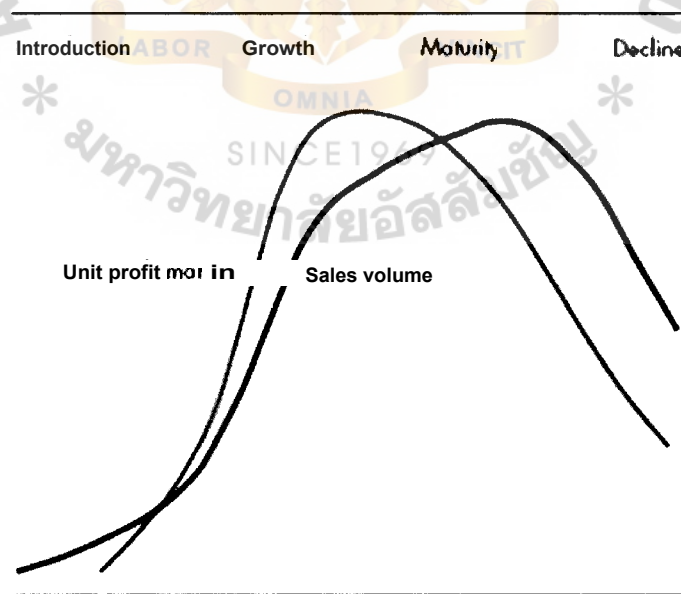
But what happened was the new product failed to move off the shelf even with big marketing support while the old brand with its prop was pulled out and resulted in

decreased sales volume and in not only did it never recovered but the company had two losers on its hands.

This example is not unnatural among the corporations. Many strongly believe that brands follow a life cycle and this is unavoidable after a period of promotion. Similar to many attractive but unproved theories in economics, the product life cycle (PLC) has proved to be outstanding imperishable but in fact, it is used in management discussions and seem to add glory and credibility to the claim that marketing is becoming a science.

The product life cycle is adequately understandable. Every product in the market is assumed to be mortal as product is born, grows, reaches maturity and reaches declining years until its exit from the market. There is a relationship between profit and volume which is shown as following:

**Figure 2.2: Generalized Product Life Cycle Pattern for Sales and Profits**



Source: Nariman and Sonia (1976)

Figure 2.2 indicates that the length of each stage is fixed in reasonable terms and one stage follows another in irrevocable sequence. But the length of different stages leans to vary from product to product. Some products shift from introduction to maturity and have almost not stay in growth stage. Other products rise suddenly in peaks like fashion, pause quickly and then drop off into forgetfulness. The stage of introduction and maturity are hardly perceivable. On the other hand, it is not extraordinary for products to gain second lives or rebirth by excellent promotions. Many brands have passed from the stage of maturity and not been forgotten.

Many product categories which persons are fond of will probably continue into long maturity stage – longer than the human life expectancy. Distinct examples are Scotch whisky, Italian vermouth and French perfume. Their life is not in decades, but in centuries. Other product categories are automobiles, mouth-washes, face creams, radio, soft drinks that are almost durable in absence of technological break-through. Other product categories are almost impenetrable to normal life cycle pressure, provided those basic needs such as entertainment, health, nourishment, transportation exists.

Product life cycle theory has shown the pattern of all products life cycle in the market which means, most of the products in the market will exit or become obsolete one day after its maturity. However, there will be some products that can survive for ages in the maturity stage without development and finally become long seller products such as drinking yogurt branded “YAKULT”, mayonnaise branded “KEWPIE”, monosodium glutamate branded “AJINOMOTO”, soy sauce branded “KIKKOMAN”, lacto soda branded “CALPIS”, stapler branded “MAX”, etc. (Fujii, 2007). This is why most of business producers will keep developing new products to maintain the popularity and market share.

ABC Thailand also continues to develop new products and launch them into the market in order to maintain being the leader of snack producers and market share. This case is case of ABC Thailand who wants to improve the lead time of bringing



new product into the market. They will need to apply the concept of Business Process Redesign.

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

Business Process Redesign (BPR) or Business Process Reengineering is very much the same concept for researcher. The most famous writer is Hammer and Champy (1993) wrote in their US best-selling book that many companies are undertaking the BPR project to improve their business process recently. The previous decade indicates that information technology has helped companies to transfer the business processes from manual to be automatic by computerized software which makes everything much faster and easier than the old days but it is only a method that helps companies doing current process faster and does not focus on the whole picture of the overall process. Therefore, in order to develop the company to get better in **all** aspects such as reduce expenditure, improve service quality, and reduce process time, the company may need to consider Business Process Redesign concept.

Business Process Redesign concept suggests business companies to try on comprising business activities from vertical to horizontal which means the company needs to orient concentration on delivered an output to customers more than internal vertical management control (Orr, 1993). The changing orientation will show a real value added into the company.

The key issue of Business Process Redesign is the question "HOW" to make a significantly change and the required steps to be followed. BPR project is necessary to focus on progressive activities and recommended changes. It is a strong recommendation that BPR requires a fundamental change in organization culture and mind-set (Caron & Stoddard, 1994). This must be carefully organized into a visible exercise to intensify the project which needs some methodological support.

### ***How to Redesign***

There are many ways to apply business process redesign (BPR) concept. There are five examples of Business Process Redesign are shown as following:

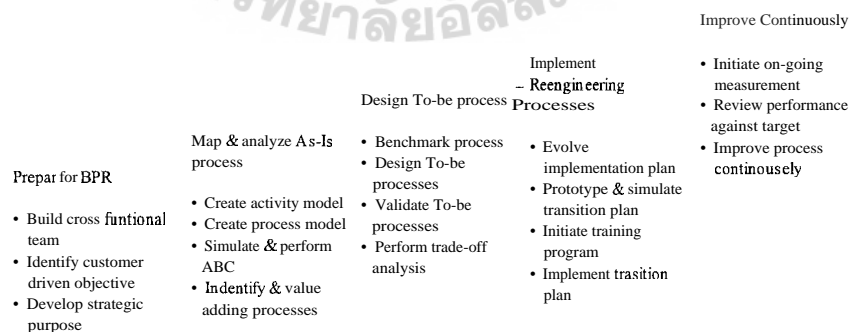
**Table 2.1: Methodologies of Business Process Redesign (BPR)**

Activity no.	Methodology I	Methodology II	Methodology III	Methodology IV	Methodology V
1	Develop vision & strategy	Determine customer requirements & goals for the process	Set direction	Motivating reengineering	Preparation
2	Create desired culture	Map & measure the existing process	Baseline and benchmark	Justifying reengineering	Identification
3	Integrate & Improve enterprise	Analyze & modify existing process	Create the vision	Planning reengineering	Vision
4	Develop technology solutions	Design a reengineered process	Launch problem solving projects	Setting up for reengineering	Technical & social design
5		Implement the reengineered process	Design improvements	As-is description & analysis	Transformation
6			Implement change	To-be design and validation	
7			Embed continuous improvement	Implementation	

Source: Mathu, Whitman and Cheraghi (1999)

Each of methodology above can be applied into different situation as appropriate. Also there is another method that consolidates all five methods above.

**Figure 2.3: A Consolidated Methodology for BPR**



Source: Mathu, Whitman and Cheraghi (1999)

Business Process Redesign methodology may need to use practical experience of system development combined with some specific business process redesign (BPR) methods. (Evans, 1993) has suggested a broad framework of Business Process Redesign project has four general steps which are as following:

- Step 1: Identify company vision, showing the desired direction the company wants to go and what the company expected.
- Step 2: Define the current situation of the business and process – "As is" situation.
- Step 3: Plan step or methodology to achieve the change in order to move current situation from "As is" to be "To be".
- Step 4: The crossing which is a high-level approach with its advantage is concerned with the plan implementation. At this stage, Evans stated that there are two recommendation opinions toward this. One opinion suggest to do this step by trying to build new processes with open-mind before understanding current process because understanding the current processes in practice might block imagination of redesign a new process while the other opinion argues that one has to understand the process clearly before getting ideas of redesigning it. Sometimes it is important to avoid.

This methodology is worth nothing since it reveals a person point of view, deliberating the fact that it is needed to switch mind-set and culture in order to support the business process redesign concept which can be started from the internal company itself rather than any taken action or advice from an external consultant. However, the stage of understanding the current process and developing a vision of redesigning process can be taken externally from stakeholders view, an outside-in aspect is required.

The core belief of this strategy is that it is form of repetitious approach. Resume to a previous stage is permitted for another processing. In practice, it was usually claimed that work at the posterior phases needs a review of the earlier stages Also, this is a

link between comprehension of current processes and developing a vision of redesigning processes. In practice, a vision of redesigning processes is necessary before understand the current process.

An important thing of development by any methodology is simulation in order to test it analytically so that it can be adjusted as appropriate. In the case of business process redesign, the project can last one or two years. Thus it requires a significant effort on those who are that engaged in the project. Besides, it has been disputed that business process redesign cannot be uniformly utilized across different cultures but have to be tailored to the definite case of the situation (Murphy, 1994; Caron et al., 1994).

### 2.3 Summary

This chapter discusses related literature. The relevant market theory of product life cycle and concept of business process redesign are presented in the study. Business process redesign concept focuses on creating a new way of improving. In this case application for business lead time reduction by rethinking the business process is discussed.

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

This study focuses on process improvement for new product development of ABC Thailand. The required data is the current process of new product development starting from the development stage to the distribution stage. Business Process Redesign (BPR) concept will be applied to process improvement in order to shorten process time and enhance marketing tactics as well as flexibility to play games among competitors. Moreover, it aims to better up supply chain upstream and relationships between the company and suppliers. The methodology of data collection and improvement will be discussed in this chapter.

#### **3.1 Required Data**

Data required to form the process mapping consists of three major points; firstly involved departments on new product development will be mapped and presented graphically in a diagram. Second, direction of task in process flow orderly will be analyzed and explained. Third, lead time required in each step will be collected in detail.

#### **3.2 Data Collection**

The Data are collected through the following techniques which are:

3.2.1 In-depth interviews: All related departments who are involved in the new product development process are targeted for key information. Flow of task and information, working cooperation, working problems or other related information is collected by using this technique.



3.2.2 Documentation reviews: Internal company documents such as year plan schedules and milestone sheets, individual project of new product plan and other related documents are studied.

3.2.3 Observations: The data process time of the new product development process is observed. Details activities of each department as well as working lead time are under observation for the measurement of process lead time of each activity.

### 3.3 Process Mapping

Process mapping identifies key activities of the process as well as task directions step by step from the starting point where the new product initiation begins until the final point at the distribution centers. Process mapping gives a better visual ideas of the entire development process of the company as well as shows the flow of information collaborated among related departments.

Visual monitoring via process mapping is very useful for highlighting flow of operational processes and process problems based on the big picture process mapping model. The results of process mapping will enable the study for the following process:

1. Link relations among departments and direction of task step by step.
2. Identify any non value-added activities.
3. Identify tasks that can be paralleled and proceed at the same time.

The process of new product development requires collaboration among the involved department; Sales, Marketing, Research and Development, Corporate Affairs, Procurement, Plant, Logistics and Distribution. Marketing is the initiator and project owner of new product development. The process begins from the seeing of steps in company year plan and can be described which are as following:

Step 1: Marketing and R&D brainstorming and creating new product character and concept referring to data of market research and customer insight.

- Step 2: R&D briefs product concept to three preferred flavor houses in order to design and develop seasoning recipe – target to get three sample flavors from each flavor house.
- Step 3: Marketing works with a preferred agency on developing artwork and packaging design as well as media plan – Approve artwork on packaging then communicate to Government Affair and Procurement team.
- Step 4: R&D gets samples of three new recipes from each flavor house – select the highest potential ones and communicate back to Marketing.
- Step 5: Marketing conducts consumer test on the best three to five highest potential - find the most preferable from the consumer, select the winner. Communicate back to R&D
- Step 6: R&D select the winner and accept all feedback and comments then gives feedback to the flavor house in order to arrange and provide a nutrition label – Communicate to Government Affairs and Procurement teams.
- Step 7: Government Affairs consolidates all required documents together with an approved artwork on packaging and nutrition labels – registers it with the Food and Drug Administration (FDA).
- Step 8: Procurement team works with suppliers in order to prepare all necessary raw materials for trial run lot as well as receives feedback from QC and conveys the result to suppliers change or make specification improvement, if required.
- Step 9: Marketing works with Sales in order to forecast the volume for the new product and consider package size; S, M, L to support consumer needs and communicate to Procurement teams.

Step 10: Procurement teams matches forecast and computes the raw material requirement using production formula – cascade raw material forecast to suppliers and commit the delivery date to plant as well as plan production schedules with manufacturing teams.

Step 11: Sales team registers new product into nation-wide retailers' data/ system - modern trade customer.

Step 12: Manufacturing teams make production run in accordance with the schedule plan – QA collects product samples and considers go-live approval.

Step 13: Logistics and Distribution teams take care of nation-wide product delivery to the distribution centers.

Diagram 3.1 indicates process flow chart of new product development of ABC Thailand.

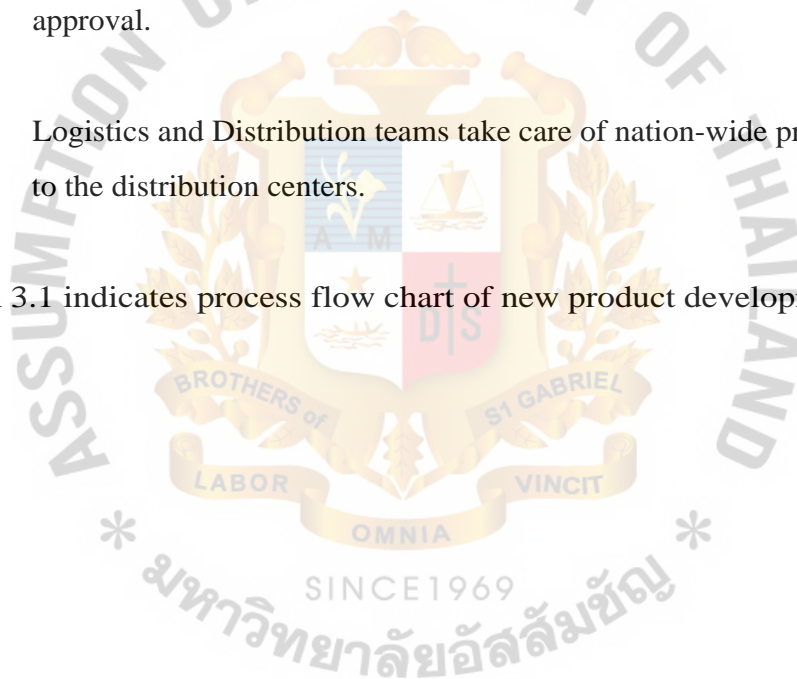
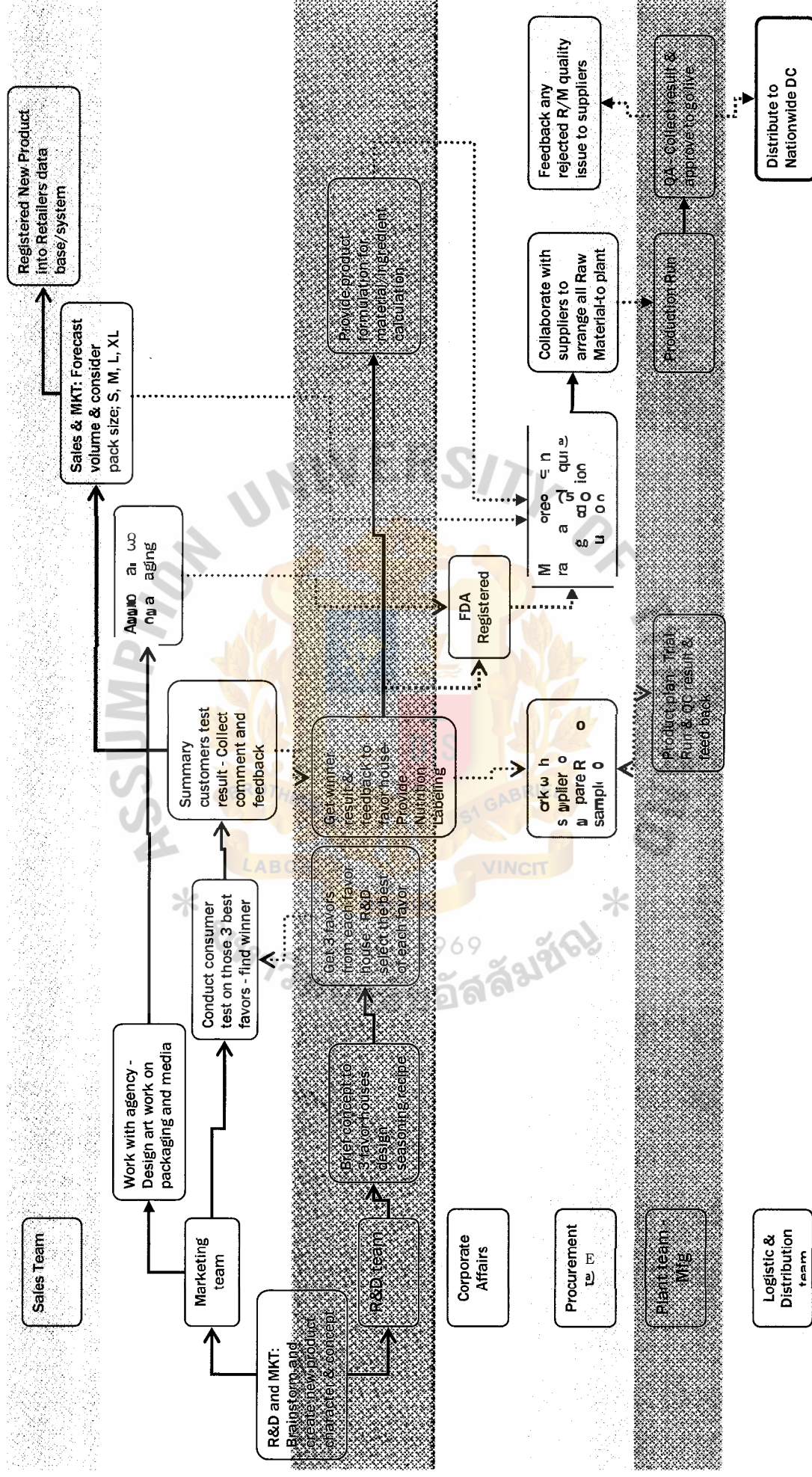


Figure 3.1: Summary of overall process flow of new product development.





### **3.4 Evaluation process and Problem Analysis**

The detailed process flow was drawn up from the data where existing problems were recognized via a visualized process whole picture. Specific improvement opportunities were identified. The concentration concentrated as areas where the change of process could improve overall consequences.

The conclusion of both process mapping and problem evaluation would show a particular type of problems where business process redesign (BPR) can be applied in this stage.

### **3.5 Application of the BPR**

Business Process Redesign (BPR) was applied in this study in order to make an improvement on reduction of new product development process lead time. The concept of business process redesign (BPR) was utilized by analyzing process mapping structure to devise the application of the BPR which is explained as a series of phases shown as following:

- 3.6.1 Interviewing project owners of new product development from marketing departments and gathering process details and time required of each process.
- 3.6.2 Drawing up new product development process flow charts and linking all directions and coordination between departments.
- 3.6.3 Analyzing as-is process flow and selecting area which are weak points, bottle necks or required long time to process with an opportunity to make an improvement.
- 3.6.4 Make and design an improvement plan in order to achieve the move from "as-is" to stage of "To-be".
- 3.6.5 Draw up a new potential flow charts of new product development processes and shorten lead time of it.



### 3.6 Summary

This chapter describes methodology of the study which respectively begins with data required i.e. departments involved in new product development process and task, direction of process flow step by step and process lead time in each step. Next, data collection was gathered by in dept of interviews from related departments and documents review. Then, the process mapping and problem analysis are focused and finally, expected outcome comparing "As-is" and "To-be" is explained.



## **CHAPTER IV**

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

This study is a case study of new product development process lead time of ABC Thailand Company focuses on how to reduce lead time of the process by business process redesign (BPR). The data is collected from in-depth interviews, observations and document reviews. These data are used to identify the process mapping and the direction of task in the process flow which will be analyzed in order with its lead time. This chapter presents results, which are divided into five steps. First are interview results with the project owner of new development and process details with lead time. Second, drawing up new product development of process flow chart and link all directions and co ordinations between involved departments. Third, analyzing as-is process flow and selecting long time process with opportunity to make an improvement. Forth, make and design an improvement plan to move from "As-is" process to stage of "To-be". Then finally, a new potential flow chart of new product development will be proposed.

#### **4.1 Results of Data Collection**

##### **4.1.1 In-depth Interview Results**

In order to collect data of current process flow of new product development, in-depth interviews were conducted to collect relevant data. All involved departments were the targets for the interview. The questions of the interview included overall process procedures of departments. The new product development (NPD), dependent process and lead time of each step as well as area of improvement.

In-depth interviews are helpful for drawing and grouping details process of overall process flow and getting a better understanding of details and its consequences. The results of the in-depth interviews are applied the ideas for generation and application to business process redesign (BPR). In this chapter the "To-be" design will be explained.

#### **4.1.2 Observation Results**

The observation of process flow can be done in some areas, which are trial run process, production run and distribution process. Those processes can be observed at the plant and help with visualizing the practical processes and its process lead time. Observation method is helpful for a better understanding of practical production procedures and continuous processes.

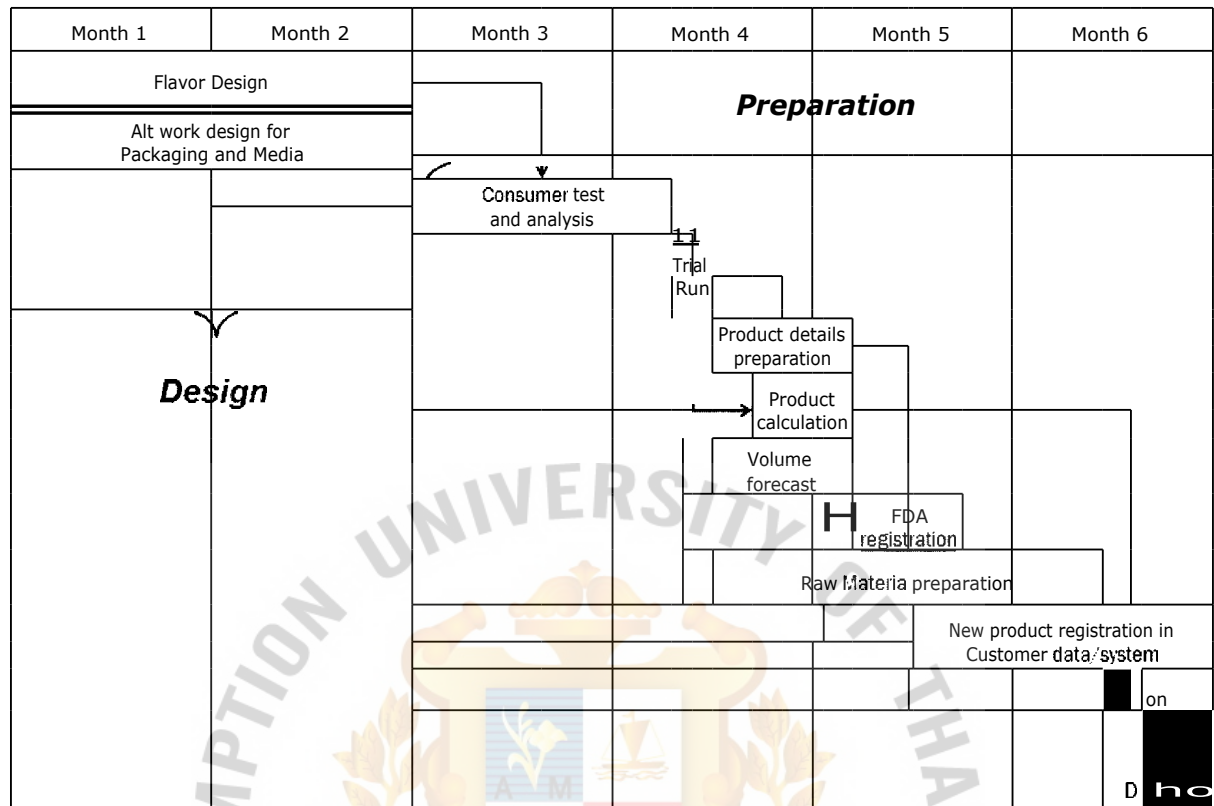
#### **4.1.3 Documentation Review Results**

Company internal documents are studied for details of process collection. Many kinds of documents involved with new product development (NPD) such as individual project timelines, summary reports, raw material sheets as well as external documents such as those documents required for Food and Drug Administration (FDA) registration and formal government paper forms are included. This method helps getting a better understanding of details and what else is required in each step of the process and lead time.

#### **4.2 As-is Process Flow Chart of New Product Development**

Figure 3.1 indicates the current process mapping flow chart which shows untidy links and directions of task which are complicated and difficult to understand. After collecting data from each involved department and analyzing the as-is process flow chart of new product development process, it shows that all processes can be re-arranged and grouped into two major stages which are stage of design and stage of preparation. The whole process of new product development which was classified into two stages is helpful for analysis and redesign. This will be explained in details at each process table later. At these steps are created in the key significant process. The As-is process after grouping is shown graphically in Figure 4.1 and more details are presented in Table 4.1 below:

**Figure 4.1: Stages of Key Process Flow of New Product Development**



### 4.3 Analysis of "As-is" Process of New Product Development

As-is process flow of new product development is explained in details in this chapter. The whole process is scoped down into stages and explained on a weekly basis. Total lead time of new product development process is approximately six months which is around twenty-four months. The process flow chart in Figure 4.1 is explained in the table. It covered a number of activities and its order, process activities, which department is in charge for the activity, dependents process number and timeline of all activities on a weekly basis. The whole picture of Figure 4.1 is described in details and is as follows:

Project Activity		Phase I										Phase II										Phase III										Phase IV										Phase V										Phase VI										Phase VII										Phase VIII										Phase IX										Phase X										Phase XI										Phase XII										Phase XIII										Phase XIV										Phase XV										Phase XVI										Phase XVII										Phase XVIII										Phase XIX										Phase XX																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Technology		Operations		Logistics		Facilities		Environmental		Safety		Health		Nutrition		Dietary		Physical		Mental		Emotional		Social		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Litera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ific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological		Anthropological		Linguistic		Literary		Artistic		Scientific		Technological		Medical		Agricultural		Industrial		Commercial		Educational		Recreational		Cultural		Religious		Political		Economic		Environmental		Geographical		Historical		Archaeological			



### 4.3.1 Flavor Design

The first step of new product development process starts after the marketing team (MKT) and Research & Development team (R&D) has finalized the idea of the new products character and concept. The process starts with flavor design at week one (W1) by R&D. The idea and concept is briefed in details to suppliers and they target at least three flavors in the same flavor concept from each supplier for flavor design bidding. It takes only one day for this step. Then, time is needed to develop new flavors in order to be aligned them with the on concept as much as possible. This step of development always takes time. Usually it could take approximately six weeks but in fact, the lead time of this step varies depending on the flavor taste results. There is some difficulty of flavor development when aligning it with the concept very often. After suppliers submit all flavor tastes, **R&D** proceeds process of internal test in week seven (W7). This takes the lead time of two weeks and then makes the final screening for selecting three to five preferred flavors are submitted to the MKT department in order to conduct consumer test later. The total lead time of flavor design is shown in Table 4.2:

**Table 4.2: As-is New Product Development Process - Flavor Design by R&D**

Process Activities		ONIA		W1	W2	W3	W4	W5	W6	W7	W8	W9
ii	Flavor design	R&D	1	X	X	X	X	X	X	X	X	X
	■ Briefing to suppliers			1								D
	■ Supplier - development process			X	X	X	X	X	X			6
	■ Internal RD test									X	X	2

The step of developing new flavors is one of the most difficult parts of NPD. This process of development always needs time. Shortening the lead time of this step is not a good decision since the quality of flavor development has a big impact on the success of the new product.

### 4.3.2 Artwork Design

The process of artwork design starts at week one (W1) after the marketing team (MKT) and Research & Development team (R&D) has finalized ideas of the new product character and concept paralleled with flavor design. This process is the responsibility of MKT. The idea and concept is briefed in details to suppliers – the marketing agency develops artwork design on packaging and media. It takes only one day for the step of briefing. Then the supplier develops a draft of the artwork. The lead time of this process takes approximately three weeks then MKT is conducted in week four (W4). One week is needed for internal proving of the artwork and giving feed back to the suppliers for adjustment. The suppliers take approximately two weeks is week five (W5) for developing the final artwork and then submitting it to MKT for final screening in week seven (W7) in order to select two or three preferred artworks for consumer test. The total lead time of artwork design is shown in Table 4.3 and is as follows:

**Table 4.3: As-is New Product Development Process – Artwork Design by MKT**

2	Process Activities	Initiator	Dependent resources	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
				X	X	X	X	X	X	X	X	8	W
	■ Briefing to suppliers			/								1	D
	■ Supplier development process (draft)			X	X	X						3	W
	■ Internal MKT prove						X						W
	■ Supplier development process (final)							X	X				W
	■ Final MKT prove											2	W

The step of artwork design is quite complex as it requires some initiation and creativity. To design packaging to be as attractive that it could be. Colors, alphabet styles, logos, brands sizes, advertising message as well as artwork are strictly considered. This factor makes an impact to consumer impression and preference for a product. To shorten lead time of this process is not a good decision as this process is parallel with the flavor design process. So there is no need to rush this process

because both flavor design and artwork are needed for consumer test process in process no.3.

### 4.3.3 Consumer Test and Analysis

The demonstration of new flavor and artwork are submitted to the outsource market research specialist to conduct a consumer test. This process is very important for NPDP. The result of this test could help a company to make decisions for launching new product into the market significantly. The process starts with recruiting target samples who are in the range of customer target groups such as gender, age, career, life style etc. The process of recruitment starts in week nine (W9) and takes approximately two weeks including areas planned for conducting group interviews. Generally, there are around eight to ten areas for conducting the interview and then the group of moderators start to travel in week eleven (W11) from one area to another to conduct the consumer test. This process takes approximately three weeks they are the week fourteen (W14). Another one week for result summary and analysis. The total lead time of consumer test and analysis is shown in Table 4.4 and is as follows:

**Table 4.4: As-is New Product Development Process – Consumer Test and Analysis by MKT and R&D**

	Process	Independent variable	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
3	Consumer test and analysis	MKT and R&D	1,2	X	X	X	X	X	X			6 W
	• Recruit target sample		x	x								2
	• Conduct group interview				x	x	x					3 W
	• Analysis testing result							x				1 W

The process of consumer test process is interesting. Even though it is a very important process, there are some procedures that can be redesign. Recruitment process can be preceded beforehand. No need to wait for the finishing process number one and process number two. Conducting group interviews also is in the plan of redesign, instead of arranging one group of moderators travel around all areas to conduct consumer test. A few groups of moderators can be formed and travel to focused area.

This can create a parallel task for the overall process. The analysis results can be quicker than one week. New designs of this process will be discussed in the "To-be" stage.

#### 4.3.4 Trial Run

After getting results of consumer test, R&D and MFG prepare to make a trial run at manufacturing in the week fourteen (W14). This process starts with checking production schedule and locks it for new product trial run at the production line. To lock production schedules, it needs to make it one week ahead. Then R&D prepares all ingredients for trial run in week fourteen (W14) which takes one week of preparation. Test run can be conducted in one day at week fifteen (W15) and the analysis of results can be conducted in around four days for quality check. The total lead time of trial run is shown in Table 4.5 and is as follows:

**Table 4.5: As-is New Product Development Process – Trial Run**  
**By R&D and MFG**

	Process Activities		W9	W10	W11	W12	W13	W14	W15	W16	
4	Trial run	R&D and MFG						X	X		2 W
	• Lock production schedule					*		/			1 D
	• Prepare ingredients							x			W
	• Test run							/			D
	• Analyze result							////			4 D

The process of trial run can be shortened as the process of checking and locking production schedule can be done beforehand and the process of ingredients preparation can be arranged paralleled with the consumer test. Then, the process of test run and result analysis can be processed earlier by following the prior process in "To-be" stages.

### 4.3.5 Product Details Preparation for FDA Registration

In order to launch new products, it is necessary to get approval from the Food and Drug Administration. The process of preparing starts in week fifteen (W15). Research & Development (R&D) and Corporate Affairs (CA) are responsible for this process. The required documents for registration are nutrition facts, ingredient lists, manufacturing process, and specification of raw material of the new product. This process starts from preparing nutrition fact and ingredient list paralleled with test run at week fifteen (W15). Those two processes take lead time of two weeks of preparation. Manufacturing process and specification of raw materials are prepared in week sixteen (W16) right after finishing test run and analysis results. The total lead time of product details preparation is shown in Table 4.6 and is as follows:

**Table 4.6: As-is New Product Development Process – Product Details Preparation for FDA Registration by R&D and CA**

	Process Activities			W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24
5	Product details preparation for FDA Registration	R&D and CA	4			X	X	X	1	1	1	1	1	3	W1
	Prepare nutrition Fact					X								2	
	Prepare ingredient List					X	X							2	W1
	Prepare manufacturing process						/1							2	W1
	Prepare specification of RMI						X	X						2	W1

The process of documents preparation can be shortened as it can be preceded beforehand. Nutrition facts and ingredient lists can be prepared after finishing consumer test and manufacturing processes and specifications of raw materials can be prepared right after the trial run is over. The process can be done earlier in the "To-be" stage.



#### 4.3.6 Product Formulation for R/M Calculation

In order to know the proportion for raw material required for the production run, **R&D** provides the formulation for raw materials and ingredients calculation to the Supply Chain – procurement team (SC). This process starts at week fifteen (W15) and takes approximate two weeks after finishing the trial run. The ratio formulation of calculation is for seasoning, ingredients and raw materials. The total lead time of product formulation for raw material is shown in Table 4.7 and is as follows:

**Table 4.7: As-is New Product Development Process – Product Formulation for R/M Calculation by RD**

			W13	W14	W15	W16		W18	W19	W20		
6	Product formulation for material/ingredient calculation	R&D			X	X					2	W
	• Calculate seasoning ratio				x	x					2	
	• Calculate ingredient ratio				x	x					2	w
	• Calculate R/M ratio				x	x					2	w

This process is quite fixed with lead time. The process need to be after trial run results in order to specify a right proportion of the mixture. It is out of the focus of redesign. However, this process can be preceded earlier than week fifteen (W15) depending on the prior process in "To-be" stage.

#### 4.3.7 Volume and Pack Size Forecasting

The process of forecasting starts in week fifteen (W15). MKT and Sales are responsible for this forecast. They start forecasting by considering many factors like demand, supply, market situation etc. In order to analyze those factors it takes one week for volume forecast then scope down to forecast volume by pack size – S, M, L after the weeks. The total lead time of volume and pack size forecasting for raw material is shown in Table 4.8 and is as follows:

**Table 4.8: As-is New Product Development Process – Volume and Pack Size Forecasting by MKT & Sales**

	W13	W14	W15	W16	W17	W18	W19	W20	Lead time (W)	W
Volume and pack size forecasting			X	X	X				3	W
			x						1	w
• Forecast pack size- S,M,L				x	x				2	w

This process is quite interesting as it starts in week fifteen (W15) after consumer test but in fact, it is an interdependent process. It can be in parallel with flavor design and artwork design at the beginning. Therefore, this process will be move to proceed earlier in "To-be" stage.

#### 4.3.8 FDA Registration

The process of registering the new product at Food and Drug Administration is very important. The approval from FDA is necessary for production run and further activities. This process starts at the week eighteen (W18) and the responsibility of the Corporate Affairs (CA). They start preparing the registrations form which takes lead time of two days. All required documents are prepared in process number five. These documents are submitted to FDA in one day and FDA certifies the documents in two weeks later. The total lead time of FDA registration is shown in Table 4.9 and is as follows:

**Table 4.9: As-is New Product Development Process – FDA Registration by CA**

	W13	W14	W15	W16	W17	W18	W19	W20	Lead time (W)	W
8 FDA registrations						X	X		2	W
• Prepare registration form						//			2	D
• Submit required documents						/			1	D
• Waiting for FDA certificates						x	x		2	W

This process is directly related to the government. It is one of the study limitations. The lead time of this process cannot be redesigned. However, this process can be done earlier by following the prior process in "To-be" stage.

#### 4.3.9 Raw Material Preparation

The process of raw material preparation is the responsibility of Supply Chain — Procurement (SC). This process starts in week seventeen (W17) after getting product formulation for raw material calculation in process number six. There are seven main items of raw material for production run which are ingredients, packaging bags, seasoning, cartons, barcode stickers, sealing tapes and bundle bags. The lead time of these items vary between two to six weeks. Sealing tapes and bundle bags take ordering lead time of two weeks. Ingredient, cartons and barcode stickers takes four weeks of ordering. The longest lead time of ordering is packaging bags and seasoning which takes approximately six weeks. These items are ordered from both domestic and international suppliers which also a reason of long lead time. The total lead time of FDA registration is shown in Table 4.10 and is as follows:

**Table 4.10: As-is New Product Development Process – Raw Material Preparation by SC**

Process activities	SC	W18	W19	W20	W22	W23	W24	Lead time (Weeks)	W
9 Raw material preparation	6.7	X	X	X	X			6	W
• Order ingredients		x	x	x				4	W
• Order packaing bag		x	x	x	x			6	W
• Order seasoning		x	x	x				6	W
• Order carton		x	x	x				4	W
• Order barcode sticker		x	x	x				4	W
• Order sealing tape		x	x					2	
• Order bundle bag		x	x					2	W

This process is the focus of redesigning. Ordering raw material starts after **getting** forecasted volume. Barcode stickers, sealing tapes, bundle bags can be put in ordering plan beforehand after getting forecast volume or these items can be put in the stock first as they are general materials. Packaging bags and cartons are ordered after

finishing step of consumer testing and seasoning can be ordered right after finishing trial run as final prove of its quality after test runs is needed. The new design of this process will be discussed in "To-be" stage.

#### 4.3.10 New Product Registration in Customer Database

Key customers of the company are divided into modern trade and traditional trade. To launch the new product into the market, it is necessary to inform and register the new product into customer database before physical sales. This process starts in week nineteen (W19) by sending product data to nationwide customers. This process takes approximately three weeks and is the responsibility the Sales department. It takes another three weeks to get confirmation back from the customer. The total lead time of new product registration in customer database is shown in Table 4.11 and is as follows:

**Table 4.11: As-is New Product Development Process – New Product Registration in Customer Database by Sales**

[illegible]

This process is in the focus of redesigning as this process takes long lead time to proceed. The data registration is sent by the sales associate – own account. Making a visit and presenting new products to be launched, then waiting for confirmation from customers are steps involved. The process can be changed to the sales administration which is parallel with FDA registration. The product data can be sent and confirmation tracked by one center. Sales associates – own account will be responsible for making a visit and presenting new product demonstration as usual. No

need to focus on sending new product data and track the confirmation by themselves. New design of this process will be discussed in "To-be" stage.

#### 4.3.11 Production Run

The process of production run starts in week twenty-two (W22) by locking production schedule one week ahead. Production run is made in one day and it needs QC process in the same day. This process is counted for two weeks because it cannot be for specific two days consecutively. It is usually one day in week twenty-two (W22) for locking the schedule and another one day in week twenty-three (W23) for physically making a production run. The total lead time on production run is shown in Table 4.12 and is as follows:

**Table 4.12: As-is New Product Development Process – Production Run by MFG**

11	Production Run	MFG	9	W17	W 18	W19	W20		W22	W23	W24		2 W
	• Lock production schedule								/				1 D
	• Production run									/			D
	• QC									/			D

This process can be shortened and the MFG team can be well prepared. The process of locking production schedule can be conducted as soon as raw materials are ready and then production run process can be shortened in "To-be" stage.

#### 4.3.12 Nationwide Distribution

The process of nationwide distribution is very short and easy. The transportation is ready for service everyday according to the distribution plan. New products are definitely in the distribution plan. The lead time of distribution to north, east, west, northeast and central regions will take only one day to reach customers. Only



distribution to the southern parts of Thailand will take two days of lead time. The total lead time of nationwide distribution is shown in Table 4.13 and is as follows:

**Table 4.13: As-is New Product Development Process – Nationwide Distribution  
by SC**

[illegible]

This process is quite lean as transportation service has fulfilled distribution plan as well. No need for redesigning.

#### 4.4 "To be" Process of New Product Development

The current process of new product development has lead time to approximately twenty-four weeks. After analyzing the "As-is" process of new product development, there are three major processes that need to be focused related to redesign which are:

- 1) Process No. 3: Consumer Test and Analysis
- 2) Process No. 9: Raw material preparation
- 3) **Process No.10: New product registration in customer database**

Redesigning of process of those processes is explained and "To-be" process is shown in Tables as following:

#### 4.4.1 Redesign of Consumer Test and Analysis Process

The process of consumer test and analysis is a focus of redesigning. This process is now the responsibility of the outsource market research specialist. Recruitment



cartons are needed to be screened for approved artwork. However, it can be ordered after finishing the process of consumer testing. Seasoning can be ordered after finishing the trial run to confirm its quality after the test run. New design of this process will be shown in Table 4.14 and is as follows:

**Table 4.15: To-be New Product Development Process - Redesign of Raw Material Preparation**

[illegible]

#### 4.4.3 Redesign of New Product Registration in Customer Database

This process is the focus of redesign and is considered because it takes too long lead time to proceed. At present, the data registration is sent by the sales associates – own account. They plan to make a visit and present the new product to be launched by waiting for confirmation from the customer later. This process is the responsibility of the sales administration teams which are parallel with FDA registration in week thirteen (W13). The product data can be sent and tracking is made on confirmation by one center. Sales associates – own account will be responsible for making a visit and present new product demos as usual. No more focus on sending new product data and

track the confirmation by themselves. New design of this process is shown as Table 4.16 and is as follows

**Table 4.16: To-be New Product Development Process - Redesign of New Product Registration in Customer Database**

[illegible]

#### 4.5 New Work Flow of the New Product Development Process

After redesigning those three major processes and re-arranging the overall process timeline of all activities of the new product development process, new work flow is shortened down from approximately twenty-four weeks to sixteen weeks. Redesign and parallel tasks in each process gradually reduces overall lead time. New potential work flow of new product development is shown in Figure 4.2:

**Figure 4.2: New Potential Key Process Flow of New Product Development**

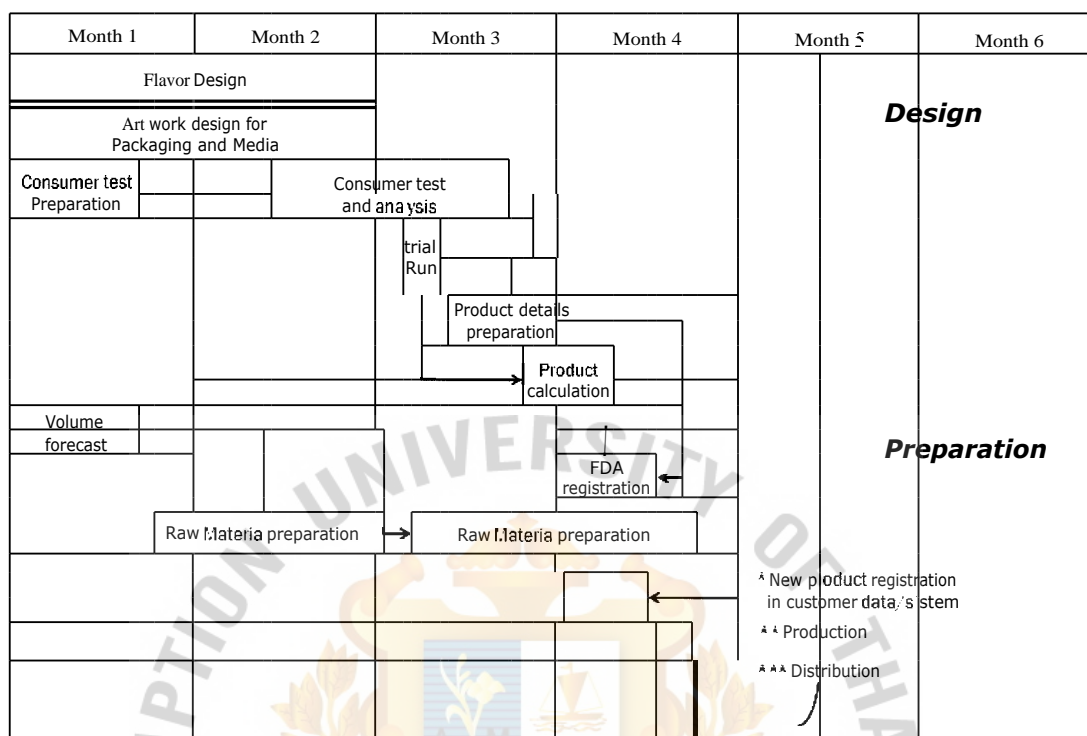


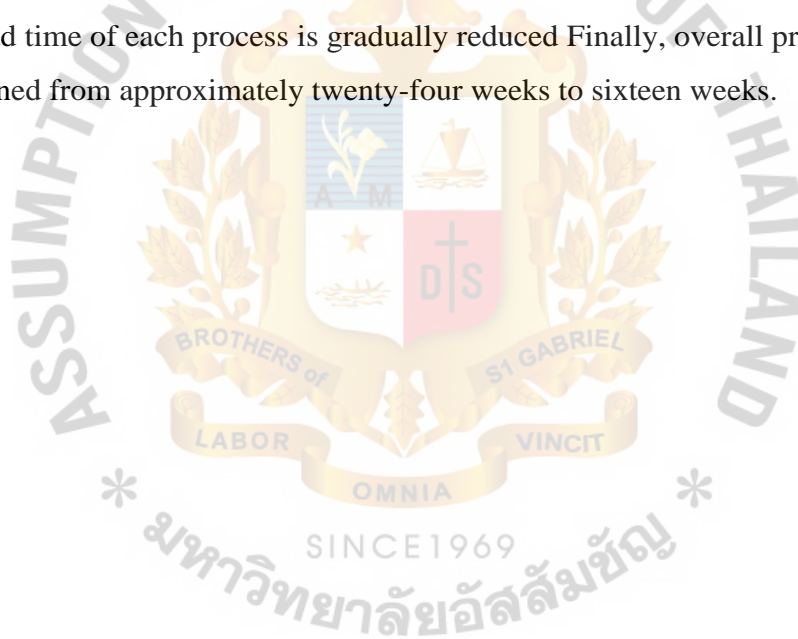
Figure 4.2 indicates that overall process of new product development lead time is reduced by applying the concept of business process redesign. There are several areas in which tasks can be paralleled and three key processes are redesigned. This results of reducing overall lead time of new product development to be sixteen weeks from twenty-four weeks. From this study, it shows that overall process lead time can create a lot of reduction in stage of preparation more than stage of design. It is because making big changes or reduction in stage of development can have an impact on the quality of new product more or less. This study focused on reducing lead time of preparation stage instead. After redesigning and rearranging the order of the new product development process all key processes lead time were reduced as shown in the Table 4.17 below:





#### 4.6 Summary

After collecting data from in-depth interviews, observations and document reviews, overall process of new product development and its lead time were mapped graphically into a process flow chart. All processes are re-arranged and grouped into two major stages which are stage of design and stage of preparation. Stage of design covers flavor design and artwork design. These processes are out of focus of redesign because shortening these two process time can make a direct impact on product quality which results in failure of sales. So the study concentrated on stage of preparation by applying BPR concept as well as paralleled the tasks of each major process. By this method, three major processes are redesign and tasks are re-arranged. Then lead time of each process is gradually reduced. Finally, overall process lead time is shortened from approximately twenty-four weeks to sixteen weeks.



## **CHAPTER V**

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

#### **5.1 Conclusions and Discussion**

This study is applies the concept of business process redesign (BRP) in order to reduce lead time of new product development process to be faster than six months or twenty-four weeks. New product development process (NPD) can be categorized into two major stages, which are stage of design and stage of preparation. Stage of design includes flavor design and artwork design process, which can be considered as development processes. Even though reducing lead time of design stage is possible, it may lead to the lower quality of the new product. This in turn, would result in failure of sales. So, only lead time in stage of preparation is considered and focused. Those processes which contained long lead time are concentrated on and make changes. The process is redesigned and lead time is shortened.

Three key processes are redesigned which are 1) consumer test and analysis process; 2) raw material preparation process; and 3) new product registration in customer database. Consumer test and analysis process is redesigned by forming a few more market research moderator teams to travel to the focused areas instead of only one team traveling around all eight to ten areas. This helps reduce work load of one moderator team and help parallel tasks by sharing work load with other group then the consumer test can be conducted at the same time in many target areas. Raw material preparation process is redesigned by ordering barcode stickers, sealing tapes, bundle bags beforehand after getting the forecast volume. Then order packaging bags and cartons are prepared after finishing the process of consumer testing. Seasoning can be ordered after finishing the trial runs to confirm its quality after the test run. The new product registration in customer database is redesigned by changing the process of sending data registration to nationwide customers. This is the responsibility of the sales administration teams instead of separating tasks by sending to the sales associate

own account. This helps centralize data distribution and tracking occur from an one center.

The rest of those key processes are considered in details are made it parallel as much as possible. Some processes are interdependent with the previous process such as volume and pack size and forecasting can be done right after completing idea generating at the beginning. Some processes are dependent and need to re-arrange after the prior process so that the dependent process can be done earlier than As-is stage. By analysis this method, it helps to re-arrange and make all processes to be in proceed order. Those interdependent processes can be moved to proceed beforehand.

This process mapping is very useful as it shows the overall process flow chart and it makes easier to monitor long lead time process. The areas of improvement are revealed through the process mapping being considered. Consumer test process, raw materials preparation process and new product registration in customer database process are adjusted by business process redesign concept. After analyzing the as-is process, making redesign and parallel tasks, overall process lead time of new product development is reduced by sixteen weeks. This change has significant improvement of reduction in process lead time. Moreover, the shorter new product development lead time would help ABC Thailand to be able to bring in new excitement for consumers in order to gain more flexibility to support this high competitive market.

## **5.2 Managerial Implications**

This study is aimed at reducing the lead time of new product development process, by applying business process redesign (BPR) concepts and analysis of parallel tasks in each process help reduce overall process lead time of new product development of ABC Thailand Company.

Redesigning of new product development process helps total lead time of overall process to reduce apparently. This helps ABC Thailand Company be able to standardize new product development process (NPD) with faster process lead time

and be more flexible to support the rapid market change in a competitive situation. Also, having short lead time of new product development then helps reduce the opportunity of information leakage to other competitors during development period.

The proposed suggestion will result in various benefits for the company such as early involvement of each department and supplies for all the necessarily preparation. Moreover, to standardize overall process also brings a lot of benefits to the company as each department can be automatically recognized which week of the development project that develop needs action for preparation. These entire concurrent activities can help company maintain market share and leader position in the market.

### **5.3 Recommendation for Future Research**

For future research, the study could focus more on developing supplier partnership and networks. Partnership with supplies can lead many benefits such as improvement in quality, increase in efficiency, lower cost, increase for opportunity for innovation and continuous improvement of products and services. With a long term relationship with suppliers, there is also vision sharing as well as long term commitment provided the needed environment for both parties to work toward continuous improvement is present.

Furthermore, long term relationships could develop loyalty and trust between company and suppliers to ensure improvement of products and services. Working with suppliers in a partnering atmosphere will also yield high quality products and services and this could help smooth up new product development in the future.



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