



**MARKET OPPORTUNITY ASSESSMENT OF PET
MULTILAYER PLASTIC FOR UHT MILK IN
THAILAND**

BY

MR. TAWIWAT SIRIPASKULWAT

**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL
FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE PROGRAM IN MARKETING
(INTERNATIONAL PROGRAM)
FACULTY OF COMMERCE AND ACCOUNTANCY
THAMMASAT UNIVERSITY
ACADEMIC YEAR 2015
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INDEPENDENT STUDY

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MR. TAWIWAT SIRIPASKULWAT

ENTITLED

MARKET OPPORTUNITY ASSESSMENT OF PET MULTILAYER PLASTIC
FOR UHT MILK IN THAILAND

was approved as partial fulfillment of the requirements for
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ABSTRACT

A market opportunity analysis for PET Multilayer Plastic for UHT Milk in Thailand was considered as an industry study which focused on society issues. The research intended to summarize success and trend of PET bottles around the world, industry structure and supply chain in Thailand, and insight, opportunity, and barrier for each supply chain unit. Moreover, we outline the major findings of key success factors and accompanying recommendations to take advantage of the opportunities for PET for UHT milk in Thailand.

Objectives of the research were as follows: (1) to identify the sales trends of PET bottles for UHT milk, (2) to identify how the PET bottles success in other country; (3) to understand trends in the milk industry in Thailand; (4) to evaluate opportunities and barriers in each milk supply chain in order to convert to use PET packaging; (5) to provide a series of recommendations might successfully penetrate the UHT milk market in Thailand.

The research was conducted by using exploratory research. Qualitative methods were used; secondary research for literature reviews and general information; and in-depth interview was used to gain the insight from each stakeholder in dairy supply chain; supplier and manufacturer, wholesaler and retailer, customer and consumer, and the government and institution sector.

Results from the interview and secondary were gathered and analyzed by using 5C framework company, customer, competitor, collaborator, and context to give an overall perspective of activities and practice, value proposition, opportunities and barriers, and the recommendations for the marketing entry strategies.

This independent study would lead existing business or other who interest in the dairy business see the market opportunity with understanding the structure of the business, and understand how PET packaging can add value toward the supply chain. Moreover, results from the opportunities and barriers analysis provide insights to the appropriate of market entry strategies to employ.

Keywords: UHT, PET, Carton, Dairy, Aseptic, Packaging, HDPE, Pasteurized.



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CHAPTER 1

INTRODUCTION

Dairy is the biggest category of food packaging industry. According to (Euromonitor, 2014), the market volume is greater than 475 billion units in 2014 with 4% growth in volume. By 2018, an abundance of chances in dairy ought to incorporate fluid containers, high-density polyethylene (HDPE) bottles, and Polyethylene terephthalate (PET) bottles would ascend nearby dairy consumption in China and also the expansion in modern retail outlets in most developing country: Asia and Africa. In developed country such as US and Europe, the key driver potentially is the appearance of product packaging and conveniently portable.

The packaging for dairy is mainly known to be flexible plastic, carton, high-density polyethylene (HDPE) bottles, Polyethylene terephthalate (PET) bottles, and glass bottles. Each has its own characteristic, properties, and capability to contain dairy products. It normally depends on the dairy processed type which are pasteurized (36% global volume), ultra high temperature processing (UHT) (31% global volume), other processes (33% global volume).

In the previous day, carton were used as packaging UHT milk products (more than 90%) because PET bottles cannot contain the UHT milk due to its properties limitation; Ultraviolet (UV) radiation protection, and the air diffusion via the skin's micro pore. Until in 2003, the first UHT milk in PET bottles had been developed which was able to breakthrough those limitations. By 2008, it was sold in Spain with more than 100% growth, and was later on distributed all around Europe and US (SIG Beverages, 2004). However, in Thailand today, more than 99% of UHT milk (Wongsombut, 2015), still use carton packaging. Not only that this kind of packaging cannot be recycled for packaging again but in order to do so it needs complicated technology to utilize. In addition to its properties, carton packaging has lower ability to keep the UHT milk in the long run when compared to PET bottles. When seeing this opportunity, therefore, it was interesting to study about this business how they can complete with other packaging and what make them successful.

In particular, about opportunity of milk industry in Thailand, this research studied the whole supply chain of milk industry in Thailand specific on UHT products,

see what is the current business practice, how PET bottles can add value to the supply chain, and what is the barrier that can restrict the entry of this packaging. In the supply chain there are dairy suppliers, packaging suppliers, processed milk manufacturing, wholesalers and retailers, end consumers, and government support. Time availability and accessibility to each stakeholder were criteria to choose target interviewees for in-depth interview.

The key success factors of milk industry in Thailand focused on industry analysis of business practices, key insight of each stakeholder, and value added to each supply chain unit. It relates to social units of Thailand's future. This research described the dairy industry overview, the supply chain of the industry, business practices, opportunity and barrier, and it helped to understand the entry strategies of PET packaging in Thailand's UHT milk industry. It was useful for people who are in this industry or people who are interested to invest in this industry. This research answered some important questions for this industry as following; who is in the dairy supply chain in Thailand, how each stakeholder in the supply chain practice currently, what is the value of PET bottles toward each supply chain unit, what is the barrier of PET bottles toward each supply chain unit, and how to recommend doing PET bottles for UHT milk business in Thailand.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Global dairy overview

Dairy is the biggest category for food packaging. According to Euromonitor in 2014, market volume is greater than 475 billion units in 2014 with 4% growth in volume (Euromonitor, 2014). By 2018, an abundance of chances in dairy ought to incorporate fluid containers including high-density polyethylene (HDPE) bottles and Polyethylene terephthalate (PET) bottles ascending nearby dairy consumption in China. Also the expansion of modern retail outlets in most developing country: Asia and Africa. In developed country such as US and Europe, the key driver potentially be the appearance of product packaging and conveniently portable.

Moreover, the packaging for dairy majority is known to use flexible plastic or plastic bag, carton, high-density polyethylene (HDPE) bottles, Polyethylene terephthalate (PET) bottles, and glass bottles. Each has its own characteristic and properties to contain dairy products. It normally depends on the dairy processed types which are pasteurized (36% global volume), ultra high temperature processing (UHT) (31% global volume), other processes (33% global volume) (*See appendix E Different in dairy processes*).

If we looked back since 1871, carton technology had been firstly introduced (Hook, 2011). It can capture half of pasteurized milk packaging market over the glass packaging and completed with UHT milk packaging since glass cannot contain the UHT milk at that time. After 1900, HDPE, and PET packaging was introduced. It raised the competitions in the fresh milk packaging as the market was able to add more value in using plastic bottles (more perceived value, flexibility, and cost effectiveness) as a result, the majority of pasteurized packaging today are HDPE and PET bottles. However, HDPE and PET bottles still had some limitation to contain the UTH milk product as its properties cannot protect Ultraviolet (UV) ray, and the air diffusion through micro pores on its wall (Dussimon, 2015).

Until 2003, the first invented of multilayer plastic injection technology allowed PET bottles can come up with multilayer of plastic inside. With this innovation, it can add PET bottles the UV protection barrier, and air diffusion

protection properties. As a consequence, PET bottles can be used to contain the UHTmilk product (Hook, 2011). The first sold UHT in PET was made in Spain, and shown the attractive growth more than 100% until 2008 (SIG Beverages, 2004). Today, global usage of PET has been expanded rapidly in many countries such as US, Europe, Brazil, and New Zealand (Packaging-Gateway.com, 2011). The percentage of global compound annual growth rate (CAGR) from 2013 to 2018 was almost 10 percent greater than other %CAGR of other packaging (Euromonitor, 2014).

2.2 Value proposition of packaging in global

PET is widely used in beverage industry with majority expansion in Asia-Pacific (Passport, 2014) because of its global value proposition of being **light weight**, has **lower production cost** (raw materials, and production process as PET is commonly use in many industry; beverage, water), and its **recyclability**. Carton, cannot be fully recycle due to the fact that many materials are composed inside (Tomba, 2004). Moreover, as PET allow manufacturers and marketers to design the shape of bottles to be more attractive, it can create the marketing opportunity and many innovative strategies to differentiate and compete in the market. In this research stated that the key success factors of PET are its versatility on its convenient packages and size, lower cost, light weight, reclose ability of cap, design driven, and recyclability which made PET perceived as one of the most sustainable packaging in the world (Passport, 2014).

If we look at the successful case study of PET used in beer packaging in Romanian, PET was able to add value to every unit of its supply chain. It reduced the production cost of packaging for manufacturing. Light weight allowed logistic cost cut while marketing was able to differentiate its brand by its flexibility and premium perception (Passport, 2014). Nation itself was able to benefit from the environmental friendly aspect of its recyclability (Friedlaender, 2016). Lastly, consumers could take full advantage of the competitive market and appreciate the power of selection since there are many varieties of product in the market (Duclot, 2016).

For UHT milk packaging successful case, Russia and South Korea has been selling UHT in PET as premium products (Agricultural office, 2011). In Russia, UHT brand Prostokvashino (Groupe Danone), allowed consumers to perceive value of freshness and trust in quality standards owing from the packaging's transparency (Dussimon, 2015). The third dairy brand in Korea offered the PET bottles designed in

the shape of female body and charged premium price. The sales increased greater than 6% (\$12 million) after launching PET bottles in the first year (Agricultural office, 2011).

In conclusion, the value proposition of PET for dairy generate from its aspects such as being low cost, convenient, transparent, light weight, designability, recyclability, reclosability, carrier-ability, and some emotional aspects such as premium look, trustworthiness, innovative design, eco-friendly, and freshness.

2.3 Thailand dairy industry

Thailand dairy market is huge according to the total market worth 50 billion THB, with 15 billion THB for UHT. The growth of dairy market is expected 10% a year with the support from private sectors, institute, and the government (Institute, 2015).

The growth of this industry has high probability as government has been supporting the increase of milk consumption per head with school milk campaign (Guittap, 2014). School milk campaign selected the milk manufacturer and distributed both pasteurized and UHT milk, serving more than 8 million students below the age of 12 and covering almost 50% of dairy market shared in Thailand. (Institute, 2015).

However, carton UHT dairy packaging in Thailand is 100% provided by SIG Combibloc, and Tetra pack company (Wongsombut, 2015). Government has to support the recycle of this and reuse it as furniture, or etc. But in Thailand market, PET used in other industry, such as juice, ready to drink (RTD), carbonated drink (Cola, Pepsi), or bottled water, PET has dominated this market even the filling technology bore no significant difference. It is called aseptic filling process, by using all clean and sterilize filling in a closed environment (Tomba, 2004). The expected growth in the PET for dairy opportunity is very large as seen by the number.

2.4 Thailand dairy supply chain

In order to apply these key success factors of PET to Thailand, it is necessary to understand the practice of the whole dairy supply chain. Thailand dairy consumption, raw milk mostly came from domestic farmers with less than 10% imported milk powder which were likely restricted by Thailand government. So upstream of this industry were farmers, and some milk farmer cooperatives. They sold

raw milk to the nearby manufacturers, mostly UHT, pasteurized, sterilized, yoghurt, or in other industry. Some cooperatives have its own manufacturing to reduce the problems of exceeding raw milk (Raw milk cannot be kept for a long period of time) and generate value added to its products. The final product is sold via wholesalers, and then retailers distribute products to customer. (Institute, 2015).

All of these supply chain was regulated, controlled, and supported by government; Department of Livestock Development, Ministry of Commerce, and Department of Industrial Work, and some institution; Thailand Cooperative Promotion Department, Dairy & Foods Industry Association, and etc. In addition, Thailand government established Thailand Milk board, assembly of government sectors, institutions, and some private sectors to drive the overall dairy industry (Nuannhopong, 2008).

UHT manufacturing has only 17 factories in Thailand, because its high investment, and product perceived as commodity which create the barrier for other competitors to enter the market (more than 90 pasteurized manufacturing). In addition, all of them are used carton as packaging. (Coriolis, 2014). However, the sales volume of UHT milk in Thailand shows 255 million sales, with average growth of 6%. Because UHT can be kept and transported in room temperature has less cost than pasteurized milk which require controlled temperature below 25 degrees Celsius (Bureau of Agricultural Economics Research, 2011).

It can be seen from the success in the global case study of PET bottles in dairy and other industries, Thailand also has great potential to study how to succeed. The study will conduct to get more insight and create value to each dairy supply chain in Thailand (Coriolis, 2014) consist; supplier and manufacturer, wholesaler and retailer, customer and consumer, and the government and institution sector.

2.5 Conclusion

From these literature reviews, there are some conclusions of how PET bottles can be successful globally and its value proposition of PET bottles in supply chain. The knowledge from literature reviews could be used as a instruction for collecting qualitative data from the parties in the dairy supply chain in Thailand. However, almost all the websites and research found was not directly conducted in

Thailand therefore, study of key insight from all stakeholders; supplier and manufacturer, wholesaler and retailer, customer and consumer, and the government and institution sector in Thailand hold their significance. These studies answered this question and provide a summary of key insight of opportunity, barrier of PET bottles in UHT milk in Thailand, and finally evaluate all those insights to synthesis the way of how to be successful in Thailand's industry.



CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research objectives

1. To identify the sales and trends of PET bottles for UHT milk
2. To identify how the PET bottles success in other country
 - 2.1. To identify the value proposition of UHT milk in PET bottles in global perspective
 - 2.2. To identify the value proposition of PET bottles
3. To understand the milk industry in Thailand
 - 3.1. An overview of dairy industry in Thailand
 - 3.2. The supply chain of dairy in Thailand
 - 3.3. The policy and trends of dairy industry in Thailand
 - 3.4. The packaging used in Thailand
 - 3.5. To identify stakeholders in supply chain of dairy in Thailand
 - 3.6. To understand the practice of each stakeholder in supply chain
4. To evaluate opportunity and barrier in each milk supply chain in order to convert to use PET packaging
 - 4.1. Supplier and manufacturing side
 - 4.2. Distributor side
 - 4.3. Consumer side
 - 4.4. Government side
5. To give recommendation in many angles and how to be success in Thailand dairy industry.

3.2 Research Design

Due to limited of time and budget of this study, exploratory research was conducted in order to achieve all of the objectives. *(See Appendix A: Summary of research objectives and research methods that will be arranged to fulfill these objectives)*

3.2.1 Exploratory research

Qualitative methods was conducted including *secondary research* for basic information of global dairy product, UHT milk product, global packaging and trends, supply chain of milk industry in Thailand, and some key success factors for PET bottles in other industries or other countries. Also, **In-depth interview** was used for evaluate insight of all stakeholders in supply chain, the value, opportunity and barrier regarding using of PET bottles for UHT milk in Thailand.

The statement below describes expected results from the research method.

3.2.1.1 Secondary research

1. To identify the sales and trends of PET bottles for UHT milk. (Objective 1)
2. To identify how the PET bottles success in other country (Objective 2)
3. To understand the milk industry in Thailand (Objective 3)
4. To give recommendation in many angles and how to be success in Thailand dairy industry (Objective 5)

3.2.1.2 In-depth interview

1. To understand the milk industry in Thailand (Objective 3)
2. To give recommendation in many angles and how to be success in Thailand dairy industry (Objective 5)

3.3 Identification of key research variables

In order to do the research, there were some important variables to be studied according to the research objectives as follows;

- (1) Previous success of PET bottles around the world;
Value proposition, barrier, growth and trend.

(2) Industry structure and supply chain;

Business practices, supply chain, stakeholders, direction and policy, external factors, etc.

(3) Insight, opportunity, and barrier;

Value added, opportunity, barrier, and etc.

3.4 Target population

Target population which was applicable for this qualitative method or In-depth interview could be described as follows;

To gather important information about industry structure and insight from all supply chain stakeholders to evaluate the opportunity and barrier of this business, target population for In-depth interview is people in the dairy supply chain in Thailand which are; supplier and manufacturer, distributors (wholesaler, retailer, and logistic), customer and end consumer, and government or related institution.

3.5 Data collection plan

3.5.1 Qualitative Methods

3.5.1.1 Secondary research

Basic information of previous success of PET bottles around the world, value proposition of PET, dairy industry and supply chain both global and in Thailand, stakeholders and their business practices in dairy supply chain in Thailand. The sources of collection data were based on journals, research, and annual press released from related private dairy company, related institution, cooperative, and also Thailand government.

(1) Journals and research: The key success factors of PET, statistic data of PET sales volume and growth rate, and the study on value proposition of PET bottles compare to another packaging type.

(2) Press release from private company, and related institution: Supply chain and value chain of dairy in Thailand, business practices of each stakeholder, and the overview of Thailand dairy industry.

(3) Press release from government sector: The policy and trend or direction of Thailand government toward dairy industry in Thailand.

3.5.1.2 In-depth interview

It was done in order to gather insights information from each stakeholder who works related in the milk supply chain. In this research in-depth interview was the majority of this study in collecting data. Around 6 - 8 interviewees from each supply chain role were interviewed. According to the time constraint, the sample size was selected as convenient sample which located in Thailand. Details were as table 3.1 below.

Table 3.1 List of completed interviewee

Roles	Amount	Interviewee
Supplier and manufacturer	9	2 big manufacturers 2 small manufacturers 2 packaging suppliers 3 dairy farmers and cooperatives
Wholesaler and retailer	8	2 Wholesalers 2 Retailers 2 Schools 2 Logistic providers
Customer and end consumer	11	8 consumers who drink UHT milk 3 customers who buy UHT milk
Government and institution	3	1 Department of Livestock 1 Development, Ministry of Commerce 1 Thailand Cooperative Promotion Department

3.6 Data analysis plan

The data analysis plans were focused on qualitative data analysis.

Framework using for marketing opportunity analysis is 5Cs (Steenburgh & Avery, 2010) it is an extent of common marketing analysis of 3C; Company, Competitor, and Customer. 5C analysis add the collaborator as the supply chain and shared value. The context which related to environment, trend, and policy toward the industry (*see in appendix F Framework for 5C analysis*). Another is the STP and marketing mixed

framework to recommend the market entry strategy. Analysis plans were performed by these following procedures:

3.6.1 Qualitative data analysis

3.6.1.1 Secondary data

Result is summarized into the two points as following;

(1) Previous success of PET bottles around the world;

Value proposition, barrier, growth and trend.

(2) Industry structure and supply chain;

Business practices, supply chain, stakeholders, direction and policy, external factors, etc.

3.6.1.2 In-depth interview

Result is summarized into three main points as following;

(1) Industry structure and supply chain;

Business practices, supply chain, stakeholders, direction and policy, external factors, etc.

(2) Insight opportunity and barrier;

General description, business practices, value added, opportunity, barrier, from every stakeholder in the dairy industry.

(3) Future direction of dairy industry and trend;

Including improvement needed, comment on future direction of PET in UHT milk in Thailand, and marketing strategies, tactics, and recommendations and how to be success in Thailand dairy industry.

CHAPTER 4

RESULTS AND DISCUSSION

Results were interpreted from both *secondary research*, and *in-depth interview*. Findings were summarized by using the five C's of market opportunity analysis framework and the investment model as below;

4.1 The Five C's of Market Opportunity Analysis

4.1.1 Customers

Customer can be classified to two part. One is the manufacturing who considered PET to be packaged the UHT production, and one is customers or consumers who buy the UHT.

4.1.1.1 Manufacturing

The value that manufacturing seeks are as following; Low production cost; surely for manufacturing to get higher profit from lowering the cost, and higher the margin. Less complexity for production; in this value, it is not only to simplify production, but also provide easier inspection process. The number of waste would be reduced if the complexity is lesser. Maintain ability of suppliers; it is very important for manufacturing to make machine consistently available, and also push the machine to work properly during any incidental breakdown by least timeframe. With spare parts, and common troubleshooting is beneficial to the manufacturing. Unique machines, if there is any problem, cannot be solved by learning from other cases. Finally, the recyclability made manufacturing reduce their disposal cost, and support the environmentally friendly factory with 100% recyclability.

To serve this manufacturing, PET has done well by serving all of these manufacturing needs. PET cost of raw material is low and can be secured by sourcing suppliers. Concurrently the production process is very simple and normally use widely in beverage industry. So with this stage, the capability to maintain the machine is very high as many industries also use this machine leading to low cost and service availability. Thai Denmark manufacturing said during the interview, "*Contract would be the big barrier; however, if the machine can make them work easier with lower cost, then it was definitely worth the value to invest*".

4.1.1.2 Customers/consumers who buy UHT

The value that manufacturing seeks and consumer seek are as following. Design; the differentiation in design can attracted customers dramatically in point of purchase, and relevant it to be a more premium product. Handling; PET can easily have designed for the unique handling way. Certain designs could prevent some slips that mostly happen with carton packaging. Recloseability; as well as handling, the reclosability is one concern for carton today. If the carton's foil is tore, it is impossible to retain. Freshness; with the trend that people are trying to be healthier by drinking fresh milk, however, most customers cannot identify the difference between UHT and pasteurized product. As more than a half of customer interviewed said that *“There is no different between UHT and pasteurized, by only perceiving that the bottled package means fresher milk, and they are happy to pay in higher price for this fresh milk”*.

4.1.2 Competitors

The trend of drinking UHT is increasing as well. The number of people's trend toward PET is very acceptable in the market which can be seen in many countries. With increasing of demand, and support from government both new investment support and environmentally friendly product support the new investment of UHT factory is widely opened. Moreover, the ASEAN Economic Community can allow manufactures to export market to those countries' members too.

Even the PET for dairy is very high. The switching cost is the biggest upcoming threat. Carton packaging is still leading the UHT in Thailand. The market currently is locked down by the competitors as the carton suppliers. There are two major companies in Thailand who supply the carton packaging which are SGI Combibloc, and TetraPak. They position themselves to the customers by creating strong long term relationship with customers. They offer the filling machine for free with a 10-year contract of buying its carton supplied. They also support in many cooperative social responsibility campaign. Both of them still focus on developing new multilayer of carton to have last longing shelflife, alternative way of disposing, or recycling the product.

4.1.3 Company

Company, the offering of its strength based on the product, which can be describe in terms of strength and weakness as below;

4.1.3.1 Strengths

The strength of the PET is their value propositions. The clear values are both functional value and emotional value. The functional values are its low cost, convenient, transparency, light weight, designability, recyclability, reclosability, hand ability. And as for the emotional values are premium look, trustworthiness, innovative, eco-friendly, and freshness. Moreover, the strength of being used in common beverages business can lead to a secured technology as well.

Another strength is the strength in suppliers and common in technology usage. As the product is plastic PET, it is easy to find the supplier who can supply you the plastic preform (the plastic which will be blown during filling process) and also the aseptic filling machine which are widely used in beverage industry; ready to drink (RTD), carbonated drink, or etc. The interview with project manager of Sidel, the global leading in beverage filling machine who has provided the aseptic machine to Pepsi, Nestle, or Coca Cola stated “Aseptic filling machine can be utilized with the same technology, and Thailand location is the strategic hub for ASEAN region to provide their service fully 24/7 and also keep critical spare-part in Thailand warehouse” This is very important for production or manufacture to reduce risk of breakdown and machine downtime. On the other word, it reduces cost of management by a lot.

Lastly, as PET is the majority of packaging used around the world the technology and research and development are supported intensively. The recyclability is the one strength of PET as of today; it can be recycling to fill another drink of bottles water (Friedlaender, 2016).

4.1.3.2 Weaknesses

It is certain that the weakness of PET is cost as well, during peak time of oil price dramatically increasing. Second is the ergonomic as the shape of cylinder is not allowed to optimize in transportation comparing to square shape.

Another weakness of PET is the low awareness of customers. Some of them do not believe that PET bottles can be kept in normal temperature as UHT product properties.

4.1.4 Collaborators

In this part, the analysis would focus on the supply chain of milk industry, stated the business practice for each side, and describe the shared interest as follow;

4.1.4.1 Raw milk supplies side (Farmers and some cooperatives)

Farmers are a person, or group of people who feed cows, and sell their raw milk. Number of farmers in Thailand was 19,862 farms which feeds more than 508,733 cows. The number shows the increase in number of raw milk production more than 2,500 tons per day (Wongsombut, 2015).

Cooperatives are form by group of farmers. Almost every farmer has membership of cooperatives. The purpose of cooperatives is for business activities to get more bargaining power to deal with suppliers, or manufacturers. One of the cooperative said that the director invest in the pasteurized process instead of UHT because of lower investment, however, he found that this investment cannot solve the problems of maintaining the stable demand of raw milk since pasteurized milk cannot keep product's shelf-life to be more than a month.

4.1.4.1.1 Business practice

Farmers only focus on maintaining its raw milk production stability with quality standard. So they have to deal with the livestock, feedings, and kinds of medical care for their cows. Then after they get raw milk, it is collected daily base by manufactures, or collected by cooperatives before sending to manufacturer. The reason of daily collection is because the raw milk must be kept cold and it has low shelf life.

The cooperatives as mentioned, majority in Thailand deal with membership to collect raw milk and sell it to manufacturers. The price is better than how much farmer could sell individually. This milk cooperative collector would sign memorandum of understanding (MOU) or buy contract with the big cooperate.

4.1.4.1.2 Shared interest

Shared interest from farmers is in demand stably and daily. The big pain is the exceed production of raw milk leads finally to waste. From the interview with one cooperative in Nakorn Pathom, he said *"Farmer's expectation is to sell raw milk with good price. But the manufacturer that are capable to process UHT, and pasteurized it is not enough"*, (Pasteurized's production is also limited because it also has low shelf

life). Another opportunity is the investment directly from the cooperatives can generate more value added, get low interest funding support by government, and increase its demand stability.

4.1.4.1.3 Conclusion

For the raw milk supplier, farmers, and cooperatives, the entry of new packaging only affect them in terms of demand raised despite being packaged neither in PET nor in Carton. But the opportunity is to increase the demand of raw dairy by raising new manufacturing of UHT process.

4.1.4.2 Manufacturing and Suppliers

Manufacturing process daily in Thailand are 107 factories, 90 of them do pasteurized and 17 do UHT. From all of these numbers, there are from 47 private sectors, 30 from government, and 30 from cooperatives (Nuannhopong, 2008). Manufacturing is one of the key drivers of the packaging process as it requires the high investment in terms of new machine. And switching cost is very high since the machine for carton and PET are not compatible. The total production of processed milk is 2,500 tons per day, which is still lag comparing to the demand, 3,500 tons per year approximately, even if there are many new machine investments over the last 5 years. (Nuannhopong, 2008)

4.1.4.2.1 Business practice

The factory simply processes from raw dairy to UHT or pasteurized product. The supply of raw milk come daily by temperature controlled room. After that the process milk is filled by the filling machine, connected to belts that fold the carton in to the square shape. The processes have to be done in a clean room (the closed system) after the filled product is disclosed by small film and lid before packed in boxes. In each process, the quality from inspection is applied regularly to keep product standard to be the finest. The waste of product is sent to disposal outside the manufacturing. The boxes are kept in store before transported to wholesalers or some customers directly (business to business or school milk campaign).

4.1.4.2.2 Shared interest

The shared interest from this manufacturing is something that can make the production easier and lower cost of raw materials or processes; packaging, production, and inspection.

As manufacturing seeking for the kind of packaging that associate with easier production for example, Thai Denmark seeks for filling machine that use less labor with full automatic process, and have 24/7 maintenance available in Thailand. Pepsi Thailand now uses aseptic filling machine from a French company called Sidel, the number of machine in Thailand require this machine maker to provide 24/7 service in Thailand since the nature of this factory also operate 24/7.

The cost of production is also the key. PET has lower cost of raw material, as well as easier process by blowing of preform and closed with the plastic cap. The inspection methods are also easy as the transparency of PET allows workers to inspect by observing.

However, since the filling machine for PET is not compatible with carton, it requires investment of new machine to produce this PET packaged. The big problem is that investing in new machine requires high funding. Some manufacturing have already invested in new machine, and its utilization is around 60%. Some has strict contract with supplier such as Tetra Pak as stated above.

4.1.4.2.3 Conclusion

Manufacturing is the key important driver for dairy packaging in Thailand. The number of factory in Thailand to serve the market is still lag as a result; some new machine investment lasts for 5 years. The new investment as well creates barrier of investing new machine for PET since both machine for the two types of packaging are not compatible. However, if look at the value, PET can serve the manufacturing need of low cost, light weight, recyclability, reliability in term of machine maintenance, supply of raw materials, and easy inspection process with transparency properties.

4.1.4.3 Wholesaler/Retailers/Own brand

Wholesalers are a big part of this business. Sometimes, it acts as an intermediate or brand owner. In Thailand dairy products are sold in many stores: convenient store such as Seven-Eleven, Tesco Lotus, Big C, or the supermarket such as Top supermarket, or traditional mom and pop. Brand owners in Thailand consist of Friesland Foods Foremost, CP Meji, and Thai Denmark. However, since the product is not different, the product trend is perceived as commodity and has completing price.

4.1.4.3.1 Business practice

This intermediate business is by buying product from manufacturers and selling them to customers by their channels. To do so, they have to manage marketing activities to achieve its sales both pushing by channel stores, and pulling by brand owners.

In the logistic and warehouse part, the transportation would change as the shape differences from the square. However, said by logistic and retailer company, *“This is not a big change since they also manage the PET bottles for other beverage industry including PET for pasteurized dairy which requires temperature control in transportation and during storage”*

The marketing activities have some marketing activist widely base on the target group. Product were differentiated by color and print, branding strategies, and the taste and flavor of the milk. Some brand had done innovative accessories such as extendable straw. Some product’s added some nutrient such as vitamin A, high protein, or Ginkgo to its contents to create more value. Price with this added nutrient is higher than the normal product. One of interviewee said the healthier trend is the key driven now, however, the design of carton box was limited to the square shape. Almost all sale channels are convenient store, modern trade, traditional trade, and kinds of specific store such as in the Fitness. Promotions that big brand mostly does is mass communication such as TV adverting, radio, internet, or billboard. The campaign related to health was their sponsor.

4.1.4.3.2 Shared interest

This intermediate interest the product can be kept with Thailand condition. As known that Thailand environment is hot and humid, carton or box tends to get wet and broken but this does not happen to PET packaging.

However, PET bottles shape does not optimize the storage space like the carton which is in square shape. However, the transparency again can support the worker to inspect or count stocks easily. And they also look for light weight product.

Another interested is the design of the product which can allow differentiation such as creating female shape product. Or use label to make outstanding looks. On the other word, it can create a lot of marketing activities including

environmentally friendly story. Interview one of a startup company who ordered manufacturing to produce their own brand said *“It was very difficult to market as there is no differentiation in consumer’s mind. It was all about milk in the carton box. The trick of flavor, taste, and design were limited”*.

Lastly, all of them expected more profit margin on selling the product, however, with this marketing condition, UHT in carton seemed to be commodity product and are mostly chosen based on its price. The perceived premium would be very interesting to them.

4.1.4.3.3 Conclusion

Wholesalers response to serve the product to the hand of customers/consumers, in terms of logistics, they expected the product to be at ease to transport and store. PET might not be the best answer for this point. However, PET has served the marketing part in term of product innovation, and differentiation. So it benefits market to variety of marketing campaign such as environmentally friendly, females shape, or handling shape. And lastly, since product is perceived premium within PET packaging, it means the price can be charged higher as well.

4.1.4.4 Customers and consumers

Customers are person who usually drink UHT milk or buy UHT milk for their friends, family, or relatives. It can be differentiated by the age, authority, and lifestyle. The majority can depend on the purpose of buying which can be differentiated by their buyers’ behaviors. It consists of buying and drinking immediately, buying and drinking later, and buying for others.

4.1.4.4.1 Business practice

Buying and drinking immediately, they usually buy dairy products from modern trade liked 7-11. So point of purchase and brand can highly influent them to buy. Customers do not understand the different between UHT and pasteurized processed products however, they are looking for the refrigerated product, and preferred product in bottles as they perceived it to be fresher. The frequent is not routinely.

Buying and drinking later, some usually buy at convenient store such as Tesco or Tops supermarket. The amount of buying is different. Customers who buy at

this stage still look for bigger packaging (mostly pasteurized) or buy in dozen pack (UHT in carton). They are looking for the product that can be kept for a longer time. Mostly this group of customer drinks milk frequently.

Buying for others, this group of customers buy milk base on what they have awareness of advertisement. This kind of group consists of parents buying for their children. The buying pattern is monthly basis. Requirement is the product that kids would drink and easy to carry. With the head of family who takes care of their children, he said that he found no difference between types of milk in the market. They know that carton packaging can keep it long.

4.1.4.4.2 Shared interest

All of them need the product that can be differentiated. Awareness is very important along with the point of purchase (POP) to sell them.

Customers today are seeking product with freshness, health giving, and also considering from product design. The different will be the frequency and amount of buying that might affect customers who buy as a whole lot, or not consuming it themselves. The price discount campaign might be more attractive. As for the convenient of the product itself, bottles would be more attractive due to the reclosability.

4.1.4.4.3 Conclusion

In the customer view, the behavior to buy is base on their needs, to drink now, drink later, or for others. In general, it would effect the amount of product, and the frequency to buy which effect the selected channel. Customers try to buy things that they are aware of and attractive to. The innovative design, the freshness, and the product were perceived to be premium.

4.1.4.5 Government and other related institution

Government or some institute that support the industry support along the supply chain. For example, support farmer by Department of Livestock, support cooperative by Thailand Cooperative Promotion Department, support manufacturing by Department of Industrial work and other support like Ministry of Commerce or Food and Drug Authorization, and etc.

4.1.4.5.1 Business practice

Government sectors do support farmers and some cooperatives to establish high quality, and efficiency of the raw milk production. Support in terms of loan, living condition, and also knowledge. Support is to guide farmers to live by themselves in such sustainable economic.

Government support manufacturer and focus support on Small Manufacturing Enterprise (SME) to become the GDP growth driven. The support is in terms of the investment, technology, and knowledge to those SME.

Government supports the commercial and social welfare such as school milk campaign to support milk consumption in Thailand, issued the regulation to prohibit the import of milk powder to Thailand, and support Thailand dairy product to export to ASEAN countries.

4.1.4.5.2 Conclusion

Government sectors primary target to drive the growth of Thailand economy and support the living standard of farmers. It aims to drive the farmers, cooperation to grow by itself. Moreover, customer would benefit from the completed market; PET and Carton packaging. The concern is that some of the policy might prohibit and not fully support the entry of new Packaging easily.

4.1.5 Context

4.1.5.1 Thailand Dairy

Thailand market for dairy was 50 billion THB and UHT was around 28% of market shared which worth 15 billion THB (Institute, 2015). The number of the increasing market share of PET packaging benchmarked from the other countries side (more than 10%) (Agricultural office, 2011).

The law and regulation in this industry is controlled and ordered by Milk board. The aim currently is to enhance the quality of milk product especially the one sold via school milk campaign. As in the interviewed, he said *“There was quality problems of the product due to the low inspection procedure, and ineffective production or none standardize production process that must be improved”*.

Thailand government supports this by providing fund to Thai cooperative to produce its own value added products; yoghurts, UHT, or Pasteurized. It is clear in term of market size that this is a big opportunity to invest in. The policy has made funding for the SME and cooperative to invest in its own machine with good quality and standard. Government also conducts business matching to support the marketing by generating domestic and foreign demands. The domestic demand is school milk campaign and the business matching is for exporting UHT products via ASEAN.

In terms of social, the responsibility, and the environmentally friendly factor in Thailand is promoted and also supported by government; carbon taxes, with technology to use PET, the recyclability has increased to be 100%. Another is supporting the welfare of farmers and creates more employment in the country which can be achieved along this roadmap campaign.

4.2 Investment model

The investment model for the PET is classified by 3 methods. The analysis based on the benefit, risk, and possibility to complete. These were done by analyzing the opportunity and barrier in terms of how successful it is possible for the PET used for UHT product in Thailand.

4.2.1 Import

With this method, the risk of doing business are less. Since the investment is only on the warehouse and high import cost; tax, tariff, and transportation cost. Fortunately, UHT can be kept for more than 6 months. By import the UHT in PET, profit margin return will be consecutively less. However, this is good in order to test the market, and generate the demand until it reach economy of scale to invest in the machine. Moreover, this model can be done because the perception of premium product from UHT in PET packaging. As the new investment, it is suitable for new entry of product testing.

4.2.2 Replace the existing machine

With the existing production line, the investment on machine should be in half, only machine adjustment and installation are required. The risk of investment is moderate, and it already has market (UHT in carton). So it ensures the demand in the market. However, careful market communication are required because the whole

product would change, and by replacing the existing product, premium price cannot be charged, nor try to offer the brand extension product with premium brand. It is not suitable for the company that does not perform well, nor have enough budgets for the new investment.

4.2.3 Add new production line or invest new machine

Invest in new machine for PET packaging. Absolutely high investment comes with risk depending on how big demand in the market. On the other hand, the return is very attractive since the economy of scale is met, the margin would be very high. Recommended to company that can take the risk or have its high reservation in doing business.

To summarize, the investment model are carefully chosen by the risk taking of the company. Firstly, might start with product trial, then choose between replacing the old machine or adding all new line machinery. By selecting this, it also effects how marketing strategies would be.

4.3 Market entry strategies

As from the analysis, the entry strategies to make the PET packaging happen, the key recommendation is what kind of the UHT market would enter as primary, and how to succeed. With association of government, the barrier of entry would be reduced, and open up opportunity. This recommendation was based on marketing framework; STP (Segmentation, Target, and Positioning), and Marketing Mixed Strategy.

4.3.1 STP (Segmentation, Target, and Positioning)

4.3.1.1 Segmentation

By selecting the UHT product that would be served in PET packaging, it can segment by;

Ordinary UHT milk such as non flavored milk and flavored milk has no difference in the market. Majority sells in the convenient store. And it is also perceived as commodity.

Dairy added nutrient, such as almond milk, dairy plus vitamin, or other supplementary food. This is a premium product in the market; however, the design is limited by the square shape.

4.3.1.2 Target

The primary target would be the dairy added nutrient group. Since product itself is perceived as premium already. The packaging can support directly to differentiate them to be more outstanding even if the market size not being huge.

The secondary target would be the ordinary milk. This is the very big market shared so it cannot be ignored. However, to introduce new product to the market, it is important to lessen the risk and deal with small changes first; innovator and early adaptor.

4.3.1.3 Positioning

the positioning of product should be placed in the premium value and price. And differentiated by it design base on value the communicate.

Figure 4.1 Product positioning map



4.3.2 Marketing Mixed

4.3.2.1 Product

The design of the product importantly should match with the product positioning: which value does it offers, and which are the target consumers. For example, the milk added some L-carnitine with non-fat, and targeting female. The

design can be the female shape which would attract the target consumer to buy. However, not only designed image, but the handling ability should fit too. Product itself should create the image of premium in the point of purchase.

4.3.2.2 Price

Price should mark as premium. It should clear the position of high value product. However, the additional price point survey should be done when doing product development survey to match the target customers.

4.3.2.3 Place

Exactly in the modern trade such as superstore or in the special store such as in Fitness lounge, business place. Distributors' relationship is important.

4.3.2.4 Promotion

The marketing communication toward the mass communication creates the awareness of the product and brand; TV advertising, billboard, social network, or radio. Also point of purchase, promotion is important to create the purchase intention of the customers.

CHAPTER 5

RESEARCH CONCLUSIONS

In summary, this research summarized **Market Opportunity of PET Multilayer Plastic for UHT Milk in Thailand** for the interest in investing in the new market also the conclusion about how the PET packaging can satisfy each supply chain unit in dairy industry. A brief description of recommendation for entering PET for UHT in Thailand based on qualitative results as follows;

5.1 Market opportunity and barrier for PET packaging in UHT market

5C analysis could tell how opportunity could be given for the market deeply. The PET packaging shown the good value proposition toward what customers need; low cost and ease of process for manufacturer, or the convenience of product to the consumer. Moreover, the company could benefit from the product solving and matching with customers' demand. Marketing also get the innovative role to deal with its customers too. With the deep analysis of competitors, even the lock down of the market has been created by long term relationship and contract, however, the barrier can also be breakthrough by the driver of market, government, and potential of new investment from new comer since the supply has not been fully filled for the market's demand. Not only customer benefit, but also all the collaborator in the supply chain can gain value of using this new PET packaging; supplier, distributor, economic, or social. There are increasing trend toward PET in global market and the support from Thailand government through many campaign; school milk, business matching, carbon taxes, or funding with low interest supported by Broad of Investment (BOI).

5.2 Investment model

Investment model depends on acceptable risk which varies depending on the source of capital, demand in the market, and the risk acceptance of the investment. First of all, the new market testing with less risk has imported the UHT product to Thailand. High cost of product leads to low marginal profit. However, after demand of the market is enough to serve economy of scale, the investment on the machine is better, choosing between replacing old machine and adding all new production lines.

The difference between this, is how the company manage the product portfolios they have.

5.3 Research utilization

This independent study would help current business person or parties related to the improvement of this industry and advantage for new players to understand the structure of the business, understand how each supply chain practice in the industry and know the insight of what they are looking for in order to capture opportunity that could develop the new market.

Moreover, results from Five C's market opportunity analysis from the whole dairy supply chain provided important key value proposition, opportunity, barrier, and the trend in order to help develop the right marketing strategy to enter this PET packaging into the industry as recommended. Marketing strategy; Primary target UHT product is the nutrient added category. The design of PET can associate the premium value of product and create high profit margin. This is a fine start for investing in the new kind of production line before expanding to other UHT product as secondary target. So it is suitable to position it as premium product with matching design to its offering value. Sell in the modern trade or special store with premium price. The promotion is direct to the mass communication with the value of product and its design.

The further research should be done on many further aspects: how to execute the marketing mixed specifically, insight of what customers want in terms of product flavor, nutrients added, preferred packaging design, price point that customers would buy what right communication and channel which they would prefer. Moreover, the investment on the UHT PET production line should start by importing product to enhance the market demand until it is feasible to have full investment on new machine. The economy of scale later can lead up to profit. In addition, the support from government also makes the investment more preferable. The business person who is interested in investing in this business should not ignore these supports.

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APPENDICES

Appendix A

Summary of matching research objectives with research methods

Research Objective	Qualitative	
	Secondary	In-Depth Interview
1. To identify the sales and trends of PET bottles for UHT milk	✓	
2. To identify how the PET bottles success in other country		
2.1. To identify the value proposition of UHT milk in PET bottles from global	✓	
2.2. To identify the value proposition of PET bottles	✓	
3. To understand the milk industry in Thailand		
3.1. To understand the overview of dairy industry in Thailand	✓	
3.2. To understand the supply chain of dairy in Thailand	✓	✓
3.3. To understand the policy and trend of dairy industry in Thailand	✓	✓
3.4. To understand the packaging used in Thailand	✓	✓
3.5. To identify stakeholders in supply chain of dairy in Thailand	✓	
3.6. To understand the practice of each stakeholder in supply chain	✓	✓

Research Objective	Qualitative	
	Secondary	In-Depth Interview
4. To evaluate opportunity and barrier in each milk supply chain in order to convert to use PET packaging		
4.1. Supplier and manufacturing side		✓
4.2. Distributor side		✓
4.3. Consumer side		✓
4.4. Government side		✓
5. To give recommendation in many angles and how to be success in Thailand dairy industry.	✓	✓

Appendix B:

In-depth interview questions

Interview questions: it takes around 15 – 30 minutes for in-depth interview

Stakeholders	Questions
Supplier and manufacturer	<ol style="list-style-type: none"> 1. General information – profile, experience, background, overview and trend of milk industry 2. Production type (carton, UHT, pasteurized, etc.) 3. Criteria to choose the production type/machine 4. Major concern 5. Strength and Weakness of traditional process (carton) 6. Do you know PET 7. Any idea if PET can use for UHT <ol style="list-style-type: none"> 1. Ask for opportunity and barrier 2. More suggestion and concern
Wholesaler and retailer	<ol style="list-style-type: none"> 1. General information 2. Product sales, types, and which product is best sellers 3. Inventory 4. Criteria of choosing product to sell 5. Consumer buying process 6. IF PET can be used for UHT 7. Opportunity for PET 8. Barrier for PET
Customer and end consumer	<ol style="list-style-type: none"> 1. General information 2. Drinking behaviors 3. Buying Process and decision making process 4. Attitude and perception toward UHT, and PET
Government and institution	<ol style="list-style-type: none"> 1. General information 2. Policy and regulation 3. Opportunity of PET in Thailand 4. Support or reject from government

Appendix C: PET bottles contain UHT milk photos

EXAMPLES: Select UHT milk products
(2010)



Appendix D:
Different in dairy processes



**Traditional
 Pasteurization:**

- High Temperature Short Time Pasteurization (HTST)
- Heated to 165°F for 15 seconds
- Perishable with a 2 to 3 week shelf life



**UHT
 Pasteurization:**

- Ultra High Temperature Pasteurization (UHT or UP)
- Heated to 280°F for 2 seconds
- Perishable with a 1 to 2 month shelf life (until opened)



**UHT
 Pasteurization +
 Aseptic Packaging:**

- Ultra High Temperature Pasteurization (UHT or UP)
- Heated to 280°F for 2 seconds
- Put in a sterile "box" like package (called aseptic)
- Shelf stable for 6 months (until opened)

BIOGRAPHY

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