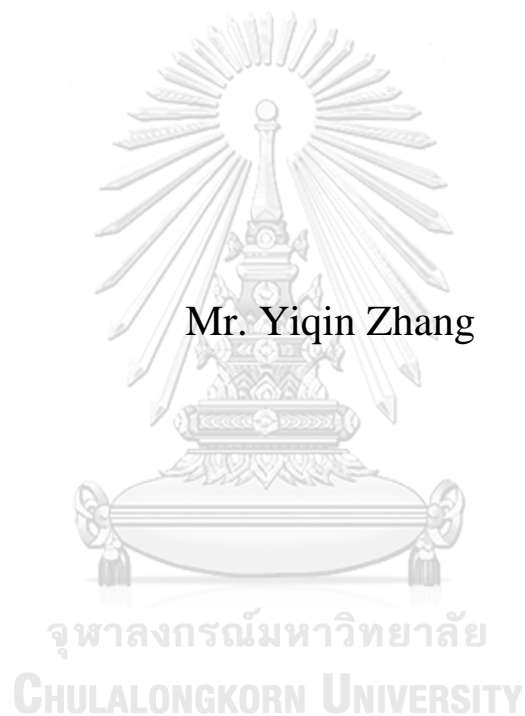


Logistics Management in Retail Field of Thailand- Big C  
Supercenter as A Case Study



Mr. Yiqin Zhang

An Independent Study Submitted in Partial Fulfillment of the  
Requirements  
for the Degree of Master of Arts in Business and Managerial Economics  
Field of Study of Business and Managerial Economics  
FACULTY OF ECONOMICS  
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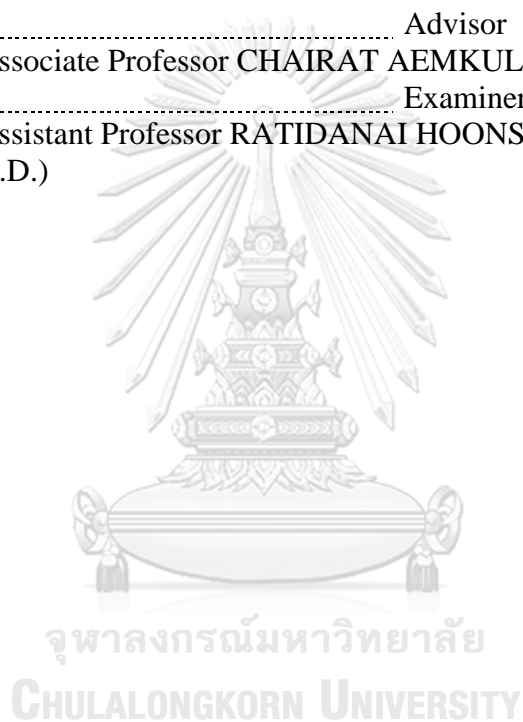
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By                                      Mr. Yiqin Zhang  
Field of Study                      Business and Managerial Economics  
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Efficient Consumer Response (ECR) as the common extension of JIT in supply chain management, which intends to manage the integrated supply chain and create product in fluent way via the supply chain between retail and supplier by new technology to meet consumer satisfaction efficiently with lower cost. According to the ECR theory, it shows that ECR Model contains four main pillars including assortment, promotion, replenishment, and new product introduction. On basis of ECR Thailand, retail needs to collaborate with suppliers through new technology and information share when catering to satisfy customer at lower cost. Moreover, this paper uses ECR theories to investigate and show how Big C implements ECR model to manage its supply chain on basis of customer needs and satisfaction. Accordingly, it is found that collaboration and information share play the fundamental factors in ECR Model. Retailer cooperate with suppliers through goods and services to create a outstanding customer advantage than other competitors, and ECR model transmits information through the supply chain, and each participant co-operates in moving products to customer efficiently.



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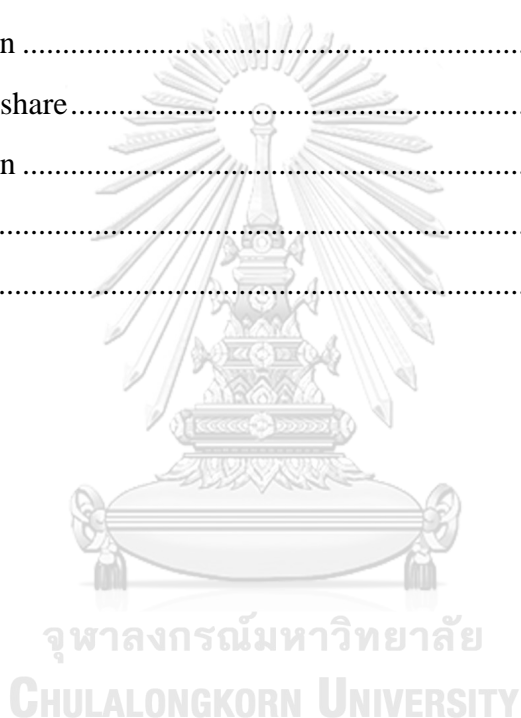
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## Executive Summary

Efficient Consumer Response (ECR) as the common extension of JIT in supply chain management, it was developed in a grocery operated by Kurt Salmon Associates in the USA (KSA, 1993). ECR Model intends to manage the integrated supply chain and create product in fluent way via the supply chain between retail and supplier by new technology to meet consumer satisfaction efficiently with lower cost. From the previous case study, it shows that ECR Model contains four main pillars including assortment, promotion, replenishment, and new product introduction. On basis of ECR Thailand, retail needs to collaborate with suppliers through new technology and information share when catering to satisfy customer at lower cost. Accordingly, collaboration and information analysis play vital role in increasing efficient ECR Model.

Berli Jucker Public Company Limited (BJC) is divided into five important business groups. Modern retail supply chain as one predominant business in BJC, it contributed 70% of total revenue and 64% of EBITDA in 2019. For this work, the single case study is conducted with one leading retailer Big C Supercenter Public Company Limited (Big C) in Thailand, and the main objective of this paper focuses on how Big C implements Efficient Consumer Response (ECR) model to manage supply chain. Accordingly, this paper uses ECR theories to investigate and show how Big C implements ECR model to manage its supply chain on basis of customer needs and satisfaction. Besides, data gathering was conducted by means of BJC annual report, financial report and corporate social responsibility report, which comes from BJC official website. In addition, the data are reliable because the document from the company and legitimate institutes.

To arrange the four pillars of ECR in efficient method. Firstly, the efficient assortment encourages retailer to optimize store assortment and increase inventory turnover. Compared with traditional retail, the one important change is that retail industry focus on customer by efficient assortment. This change needs retail to collect different functional store and diverse products in different ways so that customer doesn't purchase stuff by grouping products due to brand or cheap price. Secondly, the efficient promotion encourages retailer to change its traditional management and balance price-quality-service ratio so that attract customer attentions. Except for assortment, the most of customer are always attracted by price-quality-service compared with only by price level. Thirdly, the efficient replenishment calls for retailer to collaborate with other suppliers as to increase influent production line so that the products still on-shelf ability. Furthermore, efficient replenishment help company reduce total cost and merge warehouses into regional distribution centers. Finally, the efficient new product introduction encourages company to make use of technology to help company analyze customer behavior so as to promote new product introductions.

According to the analysis of case study, it is found that collaboration and information share play the fundamental factors in ECR Model. Retailer cooperate with suppliers through goods and services to create an outstanding customer advantage than other competitors. Collaborative ECR Model in supply chain management is important for retailers that arrange to offer the expected products and services to customer that

means cannot always be achieved the aim of satisfying customer at lower cost independently by a single organization. Therefore, providing customers with better different types by collaborative method: co-operation agreements, technical knowledge operate, strategic alliances, partnerships and so forth.

In an ideal product replenishment system, all participants in the supply chain have at any time a sufficiently accurate knowledge of how many products are moving or stored at each point in the chain. Therefore, it is important that collaboration partners can quickly deliver accurate information to each other for demand forecasting. Stock levels in the supply chain can be reduced and distribution operations in the supply chain can be simplified so that less time is spent in unnecessary intermediate stages. Efficient product replenishment has been estimated to yield most of the ECR savings, which ensures that the product flow in the supply chain can adapt to the real demand of the customer and reach to the final consumer in efficient way. Furthermore, ECR emphasizes the importance of partnerships, and the partnership relationships between retailers and suppliers try to build up a long-term relationship being full of reliability in the retail supply chain.

ECR model transmits information through the supply chain, and each participant co-operates in moving products to customer efficiently. Accordingly, accurate and quick information must be used to support effective retail business so that retailers need to take advantage of uniting with pieces of information to obtain an organized scope with different consumer behavior patterns. Technological tools form the basis of ECR Model and new efficient operations. Information collected includes the name, brand and price of the product, as well as shopping baskets and shopping times. Information collection offering a practical way of gathering information about customers, have become more common in retail industry. The sales data can also be used to create local assortments in line with consumer needs and in launching new retail segments. Another key area of ECR Model is data sharing. Information systems also enable increasingly accurate cost accounting. Activity-based costing facilitates the modelling of actual costs at all retail value chain process stages and thereby helps in identifying improvement areas or defining new metrics for operational efficiency.

## 1. Introduction

### 1.1 Company Background and Significance of the Problem

In 2001 Thai Charoen corporation (TCC)<sup>1</sup> became the majority shareholders of Berli Jucker Public Company Limited (BJC)<sup>2</sup>. Then in 2016, in order to implement its modern retail supply chain, BJC finished its acquisition of Big C supercenter and occupied 97.94% shares. From this succession of business actions in 2016, it indicates that BJC implement a long-time strategy to increase retail supply chain performance.

Berli Jucker Public Company Limited (BJC) is divided into five important business groups. Modern retail supply chain (Big C) as one predominant business in BJC, it contributed 70% of total revenue and 64% of EBITDA in 2019. With outstanding innovation and efficient management, Big C has become a leading modern retailer in Thailand, it always tries to be price leadership in retail field of Thailand. Besides, Big C Supercenter makes efforts to be satisfied with customer needs. According to annual report, Big C totally reached to 1,369 bricks and mortar stores in Thailand. Moreover, the Faculty of Commerce in Chulalongkorn University and The Stock Exchange in Thailand evaluated the current brand of Big C Supercenter reached to 127,012 million baht.

As for a retail supply chain, it is a sequence of events intended to meet customer need. How does retail supply chain satisfy customer need? It needs fast delivers, lower cost, perfect and reliable product in right place through efficient retail supply chain. To satisfy different customer segments, on the one hand, BJC not only expand Big C multiple stores, but also adjusts to its strategy for retail supply chain and improve its offering and service to meet customer needs more efficiently. On the other hand, BJC has created vertically integrated supply chain especially its retail supply chain plays an irreplaceable role.

It's well known that the success of every company or firm relies on customer satisfaction. Donald Waters (2003) says that the retail industry would save so much cost if it smoothed its supply chain. Efficient Consumer Response (ECR) model, as one commonly used form which extends the benefits of JIT<sup>3</sup> (Just in Time) to the who supply chain, it brings better customer service and lower costs for supply chain management<sup>4</sup>. Moreover, Big C is one of members in ECR Thailand which aimed to help member companies reduce cost, enhance the efficiency in delivery goods to customers with proper way and reasonable price in time. To analyze and seek out related research question, this paper uses a case study to demonstrate how Big C implements Efficient Consumer Response (ECR) model to manage its supply chain.

### 1.2 Research Question

To demonstrate the case study, the paper seeks to explore the following question: How does Big C implement Efficient Consumer Response (ECR) to manage supply

<sup>1</sup> The Thai Charoen Corporation Group (TCC Group) is a large group of Thai Businesses including five important business lines which are beverage businesses, real estate business, business insurance and financial business lines, including the agricultural and agro-industrial business.

<sup>2</sup> Berli Jucker Public Company Limited (BJC) was founded in 1882 and has evolved from a supply chain and distribution powerhouse into a leading integrated retail platform in ASEAN with strong manufacturing and distribution capability.

<sup>3</sup> The just-in-time (JIT) is a management strategy that minimizes inventory and increases efficiency.

<sup>4</sup> Supply chain management (SCM) is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage.

chain?

### 1.3 Research Objectives

In order to answer the previous question, the paper is to analyze and illustrate the following objectives.

- 1.3.1 Efficient Consumer Response (ECR) is commonly used in supply chain management in the world retail field, so it is very useful to understand what Efficient Consumer Response (ECR) and ECR Thailand are.
- 1.3.2 Big C as one of members of ECR Thailand, it is systematically known how Big C run its supply chain management through ECR model.
- 1.3.3 From the case study, according to the analysis of ECR model in retail supply chain management, the paper analyzes the second data to investigate whether retail supply chain can be improved through ECR model.

### 1.4 Scope of the Study

Ayers (2006) defines that the supply chain is a broad concept, which means one product complete life-cycle process is to meet the customer needs by physical product and service. Based on this concept, it indicates that supply chain needs to satisfy the requirements of customer composing market segment. From Ayers' viewpoint, retail supply chains include more than stores in their makeup, and the successful retailers must design and make proper and efficient retail strategy management. Besides, retail supply chain reacts to the customer need by providing efficient service which match their requirements as to get maximum efficiency. Additionally, company needs to afford products by efficient supply chain management with low or acceptable costs so as to meet customer's requirements (Walters, D., 2003). Customer service strategy should cover two ranges: the first one is the volume and profitability of the customer, and the another is understanding of what the customer really want which help company to optimize and implement its strategy in supply chain.

It has been seen that customer satisfaction can be a key configuration component for the efficiency of company performance. Herbert Kotzab (1999) describes that Efficient Consumer Response (ECR) was popular operated as a useful model for improving the supply chain performance among the US grocery industry in 1992. Besides, he also said that Efficient Consumer Response (ECR) which oriented from the name "just in time" (JIT) in grocery industry decreased the cost and improve customer needs. Johnston (2001) analyzes that a case study to argue that ECR requires collaboration and trust in supply chain which decrease cost, increase benefits and minimize the risks of ECR implementation. Moreover, Beverly (1999) emphasizes that ECR is a potential way for retail field which not just only focus on distribution in a traditional perspective. Therefore, for retail supply chain, successive improvement of company performance has become a vital concentration for supply chain management, such as customer service for continuous business growth. With the increase in competition, except for the decreasing uncertainty in demand and supply, companies minimize actual cost and increase consumer satisfaction in terms of supply chain

management in retail field.

After acquiring Big C, BJC has owned completely integrated supply chain business form upstream to downstream. In a supply chain, downstream means deliver products to customer, Big C as an important downstream component of BJC modern retail supply chain, it focused on being capable of meeting needs from different customer segments through offering reliable quality products with rational prices, responding to customer different needs in quick and efficient channel.

### **1.5 Possible Benefits**

From this paper, it can imply that customer satisfaction is vital success to remain ahead of company's other competitors.

1.1.1 ECR model as a common way to implement in retail supply chain, especially Big C take part in ECR Thailand. when company understands what ECR model is, it will help company learn to save cost and increase efficiency supply chain to be satisfied with customer need in quick and proper method in right place. Meanwhile, ECR Thailand organize meeting to help member to improve efficient supply chain management.

1.1.2 From the case study, it indicates how Big C run its supply chain management by ECR model. ECR also focus on well cooperated relationship, but it not only internal management of one company. Furthermore, final customer is one most important considerable factor in ECR model.

1.1.3 Through to understand ECR model and its content, it is helpful and useful for retail company to run supply chain management in efficiency. Besides, ECR is rational choice by retail company to improve supply chain management.

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## **2. Research Methodology**

### **2.1 Conceptual Framework**

The purpose of this paper is to seek and demonstrate how Big C implement supply chain via Efficient Customer Response (ECR) model. In this paper, it uses qualitative research methodology to seek out the purpose of the paper and collects data to analyze whether the supply chain management of Big C gets improvement through Efficient Customer Response (ECR).

As for the choice of methodology on research of supply chain management, scholars normally use qualitative and quantitative methodology. Yin (2018) emphasizes that it's better to choose case study research when research topics focus on "how" or "why" questions and the study is a contemporary phenomenon. In addition, Yin also underlined that one case study is a common design for doing case study research, and the single case design is commonly rational under five situations.

Golicic (2005) analyzed and compared the qualitative and quantitative research methodology when scholars do the analysis of management in supply chain,

nevertheless, when the research question is dynamic, complex and updated, and the relevant variables are hardly organized, the qualitative research can be chosen to make deeper research and identify. Moreover, case study research is more valuable, which avoid some weakness and help to deal with the data collection and analysis.

Lisa (1996) shows the case study how to analyze business research as a academic method. It explains the misconception on case study. If one paper is to explain phenomenon, qualitative methods are suitable ways to achieve this aim. Besides, the author classifies the research methods by the major research objectives and questions, she points that it uses qualitative methodology including case study, case survey if the objective is exploration and questions are related to how, why. In addition, the case study is dig deeper to the theory, from the surface of which, tries to augment the depth of research. Even though case studies are not suitable for every research situation, it is adopted in many different categorized research fields. Besides, case study includes a single and multiple cases. The former one fits the phenomenon which shows a well-developed theory, but the latter one can replicate same qualitative cases. But most of all, no matter research method is chosen, a good research should keep the following requires being external validity, reliability, construct validity, and internal validity.

## 2.2 Data Collection and Analysis

Stuart (2002) presents what a five-step case-based research is and how researchers design its research for each step in the process (Figure 1). Lisa (1996) indicates that qualitative methods are preferred to be used when researchers intend to explain phenomenon as a goal, since they afford a depth and enrichment, case study let researcher to find out the how and why questions. Besides, case study can test existing theory by testing a case study to get further and deeper research. Besides, case studies can also afford descriptive method in a small data scale. For instance, no matter it is a single or are multiple case studies, it can be used to explain, or predict sequences depend on past appearances in same situation. Moreover, Lisa also emphasized that the specific analytical procedure needs to be formed in case study via research design, gathering proof data, developing theory, explanation.

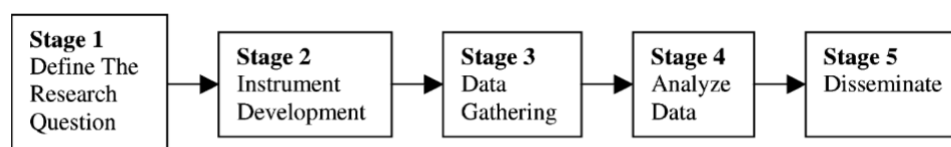


Figure 1: The Five-Stage Research Process Model

Source: *Effective case research in operations management: a process perspective. Journal of operations management, 20(5), 419-433.*

Seuring (2005) tells that organizing the research way to draw strict research. In addition, case study is very useful because it is helpful to encounter the weaknesses from a formed research approach and improve the way collect and analyze data. Lisa (1996) emphasizes that one experiment or one case is suitable as the case shows a existing case to test a well-developed theory. ECR is a developed theory that has adopted by many countries, in this paper, it tries to seek and probe the phenomenon



how Big C run supply chain by implementing ECR model. On the other hand, to increase the reliability of academic research, Seuring (2005) points out that secondary data can be used in papers as proof of the validity of one.

Yin (2018) defines that case study research can be used in descriptive, explanatory, and evaluative modes, and the descriptive method is to indicate a existing phenomenon of this case in a real-world situation. Reyes (2005) shows that descriptive methodology is used in articles that describe the ECR procession and afford frameworks/strategies to use ECR. For this work, the single case study is conducted with one leading retailer Big C Supercenter Public Company Limited (Big C) in Thailand, and the main objective of this paper focuses on how Big C implements Efficient Consumer Response (ECR) model to manage supply chain. Walters (2003) analyzes that supply chain management aims at providing with high customer satisfaction under the low or acceptable cost. In order to improve supply chain, company is always satisfied with customer needs by the mean of increasing efficiency of supply chain. Tony Hines (2014) indicates that Efficient Customer Response (ECR) intend to unify supply chain with customer demand to manage products in efficient via the supply chain to satisfy consumer need with lowest cost. After Berli Jucker Plc. (BJC) acquired Big C, Big C as a modern retail supply chain has become vital role to satisfy customer needs with lower cost. Accordingly, this paper uses ECR theories to investigate and show how Big C implements ECR model to manage its supply chain on basis of customer needs and satisfaction. Besides, data gathering was conducted by means of BJC annual report, financial report and corporate social responsibility report, which comes from BJC official website. In addition, the data are reliable because the document from the company and legitimate institutes.

### **3. The Development of ECR**

#### **3.1 The concept of ECR**

Tony Hines (2014) indicates that Efficient Customer Response (ECR) intend to unify supply chain management with customer demand to create a smooth flow of product via the supply chain to satisfy consumer demand in efficient with lowest cost. From John Fernie & Leigh Sparks (2009), they define that most retailers like to cooperate deeply with suppliers to increase the efficiency of the retail supply. Meanwhile, supply chain management with ECR model provides a framework to collaborate together in efficiency between retailers and suppliers. Donald Waters (2003) emphasizes that ECR is not to have huge stocks sitting in the supply chain, but to deliver items efficiently, and respond to customer demands by more instant. According to KSA (Kurt Salmon Associates, 1993), ECR involves more concepts, including quick response and customer focus due to the high level of trust requiring to be successful.

Sami Finne & Hanna Sivonen (2009) explains that ECR for the first time provided a concrete framework for retailers and suppliers to be willing to manage their supply chain in a mutually beneficial way. Hence, a 'win-win-win' result among suppliers, retailers and consumers in ECR model compared with a traditional way. Besides, they pointed that Efficient Customer Response (ECR) could help US grocery industry save annual more and less US\$30 billion and decrease 41% of inventory according to Kurt

Salmon Associates (KSA) report. Besides, ECR Europe estimated that savings can increase about 3.3 % of net sales, achieving to 28 billion euros in 2005. Furthermore, Tony Hines (2004) underlines that Efficient Customer Response (ECR) model includes four pillars, such as store assortment, promotion, replenishment and new product introductions. What's more, Tony suggested how retail industry implement supply chain management in accordance with four pillars of ECR model: (1) Efficient assortment – to optimize store segments as to improve inventory turnover. (2) Efficient promotion – to reduce the avoidable cost and improve promotion. (3) Efficient replenishment – to integrate the distribution line such as from the production line to the retail shelf with collaboration. (4) Efficient new product introductions – to decrease the cost when it introduces new products.

### **3.2 ECR model in USA**

Efficient Customer Response (ECR) is started to be used to increase competition among the conservative American grocery industry in the early 1990s between Wal-Mart and Gamble because the economic recession and new severe competition. Once again, according to severe competition and new retail formats, KSA <sup>5</sup>(1993) estimated that ECR could increase the US grocery industry by total annual savings about US\$30 billion and decrease 41% inventory. It would be equal for suppliers and retailers to get savings. It was noted that most of the savings for customers to be lower prices due to the severe competitive industry. However, it has been argued that in reality the consumers never saw the lower prices in the United States.

### **3.3 ECR model in Europe**

Since 1993, ECR model has founded in Europe where the European Executive Board was created in 1994. The European ECR defines ECR as a global movement in the grocery industry to concentrate on the total supply chain including suppliers, and retailers, which collaborate with together to arrange the changing demands of consumer with better, faster response and at least cost. According to Coopers' study (1996), ECR could lower the costs of the retail value chain by 5.7 %, calculated in terms of consumer prices. Of this amount, most was estimated to come from decreasing operational costs.

### **3.4 ECR model in Thailand**

ECR Thailand was founded in 1997 when Thailand met with economic crisis. The main purposes are to reduce cost and enhance the efficiency of delivery for customers with reasonable price in time. ECR Thailand members includes different companies and organizations. ECR Thailand encouraged members to enhance corporation relationships between business partners. ECR Thailand has emphasizes on optimizing the supply chain management for consumer goods. It also affords different useful activities to share knowledge and experience among members which can help increase the collaboration among members as to remain secure and make profits in the tough economic condition.

ECR Thailand is a good example of adoption. Besides, the ECR Thailand Board Meeting always hold every 2 months, and the meeting is to share its management method and experience among members such as on-shelf availability, collaborative

<sup>5</sup> Kurt Salmon Associates Kurt Salmon was a global management and strategy consulting firm formed by the merger of Ineum Consulting and Kurt Salmon Associates (KSA) in January 2011.

planning, forecasting, and replenishment, distribution networking optimization and e-invoicing. Moreover, it represented that the expected benefits in Thailand had been showed to decrease equivalent to 7.7% of consumer prices being equal to Thai Baht 38 billion.

#### 4. Case Study- ECR Model of Big C

Walters (2003) tells that supply chain manage divided into two parts, upstream and downstream. Suppliers normally occupies at the position of upstream. As for retailer, it has different criteria to purchase commodities from suppliers. Generally, most companies like to make sanction with suppliers who have good service and reliable negotiation. Retailers prefer to use more suppliers as to decrease potential risk, and it always monitor supplier performance by supplier rating or vendor rating due to satisfaction from suppliers. Moreover, companies need to obey process when purchasing commodities. There are two factors which are cost and time affecting the cycle of procurement. Fernie (2019) emphasizes that retailers have a main interest in the supply chain of its supplier and other intermediaries. And they also agree that supplier with errors and delays will impact the efficiency of supply chain in the process of retailer to match the customer needs. Therefore, many retailers start to collaborate with supplier. As the most important component of Modern Retail Supply Chain in BJC, Big C operates by fully integrated network of physical formats in terms of customer needs throughout Thailand. Besides, the modern retail supply chain plays a vital role to make the Big C stores become a “one-stop shopping destination” for customer. Besides, it is well known that modern retail supply chain is Big C’s largest supply chain and brought 70% of total revenues within successive there years (Figure 2).

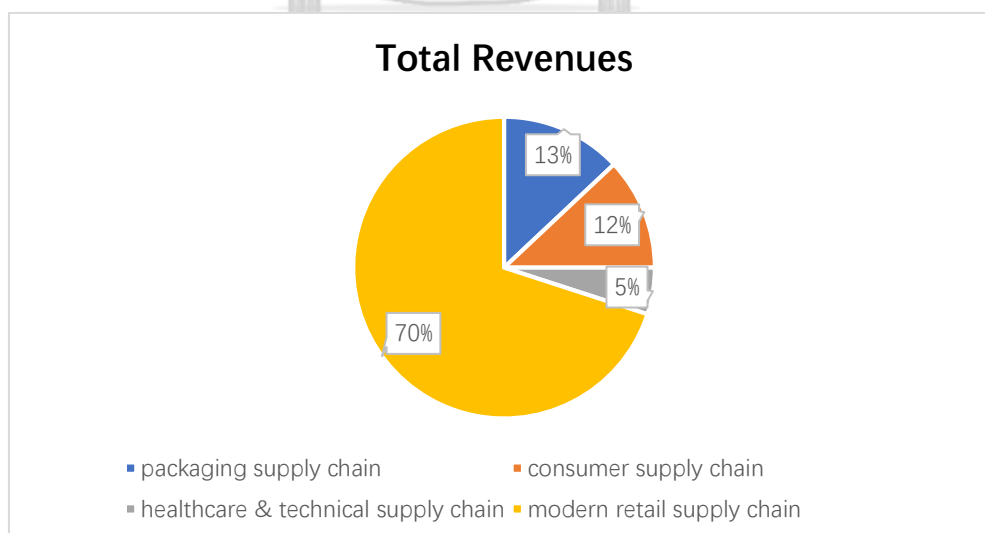


Figure 2: The Total Revenues Structure of Big C  
Sources: BJC Annual Report (2019)

#### 4.1 Implementation of ECR Model

According to Hines' (2004) perspective, when retailers are willing to satisfy their customers via ECR Model, they need to make assortment, promotion, replenishment, and new product introductions in efficient way. Big C is one of ECR Thailand members, it not only focuses on responding to customer spending efficiently and conveniently with the different economic situation, but also concentrates on creating good and trust collaborative relationship with business partners, trade partners and other interested parties. From this part, on the one hand, it demonstrates how Big C implement ECR model to manage its supply chain. on the other hand, it analyzes data of Big C in accordance with implementation of ECR model to investigate whether Efficient Consumer Response (ECR) is a strong tool for improving the efficiency of supply chain management in retail industry.

#### **4.1.1 Efficient Assortment of Big C**

The first pillar of ECR model is store assortment, Finne and Sivonen (2009) says that the retail format and the needs of the target customer segments can achieve assortment pillar which leads to developing individual categories and service. Big C is a retail hypermarket with shopping mall area. In order to expand its store network nationwide in various formats, Big C always delivers exceptional shopping experience to customers through product assortment, quality, value for money and customer service. At present, Big C is operated and managed under BJC. The fierce competition is extending around retail industry. However, it was reported that convenience stores have been able to expand and have become a domain format for investment in retail field. In 2019, there were 238 retail outlets under the chain store format, including Big C hypermarket, mini Big C, and Big C Food-place supermarket.

According to Big C annual report, Big C has three main bricks and mortar store formats. One of store formats is Hypermarket segment including Big C supercenter and Big C extra. For Big C Supercenter, it is a hypermarket targeting mid-to-low income customer and offers maximum value with the mix of low prices, a broad choice of goods and services. Besides, Big C Extra is for higher income customer segments offering all kinds of imported products, as well as a larger selection of top of the range items and services on top of a complete Big C Supercenter assortment. Another store format is supermarket segment being composed of Big C Market supermarket and Big C Food Place store. The former one is a supermarket format for mid-to-low income customer segment by providing a wide range of products from fresh food to electronics, and the latter one is a new format to target mid-to-high income customers who particular focus on ready-to-eat, organic and healthy food, and keen on imported product assortments in urban areas. The final store format is small store segment such as proximity/convenience Mini Big C aims to mid to low income customer segments. Proximity Mini Big C stores sales a broad assortment compared with normal convenient stores.

At the end of 2019, Big C has opened amount of 1,016 Mini Big C stores. Since acquiring Big C, BJC group has been expanding Big C store formats, especially the increasing number of Mini Big C. From the Table 1, it indicates that the total number of Big C multiple stores and Mini Big C have increased 71.8% and 118.5% respectively from 2016 to 2019.

Big C	Big C Supercenter	Big C Extra	Big C Market	Mini Big C	Pure Pharmacy		Big C Food Place	Total
2016	116	15	59	465	142		-	797
2017	125	15	60	642	135		-	977
2018	132	15	60	783	140		1	1131
2019	135	15	58	1,016	145		3	1369

*Table 1: The Annual Total Number of Big C Multiple Stores (not include Big C online shopping mall)*

*Sources: BJC Annual Report (2016, 2017, 2018, 2019)*

#### 4.1.2 Efficient promotion of Big C

The second pillar of ECR model is efficient promotion which contributed to the practice of measuring marketing and trade promotions efficiency, more accurately and extensively. Brown and Bukovinsky (2001) emphasized that efficient promotion encourages modern retailer to change different way to arrange promotional activities not only cheap price. Moreover, efficient promotion also leads to decreasing transport and product cost. Big C not only offer its slogan “complete selection of everyday products at low prices”, but also concentrate on product quality and consumer service management to increase Big C promotion.

In order to guarantee fresh food quality, Big C is cooperating with different supply chain from farm-to-shelf so that it decreases the transport and cost. Fresh food team of Big C visits farms and factories to help farmers to cope with and develop their products so as to meet food safety needs with FDA<sup>6</sup> standard. Besides, fresh food quality control team works at Big C fresh food distribution center and arrange 24/7 shift to check products and make sure the fresh food to meet the requirements. Moreover, to improve the efficiency of quality control, product specification ensures that products meet specification by checking information list set in digital tablet form. In addition, fresh food quality control team run a laboratory at fresh food distribution center to implement and guarantee fresh food without over pesticide and chemical level. Meanwhile, quality assurance team normally check and monitor Big C all stores condition and environment which comply with FDA rules and requirements.

Big C still promotes “Big C big service”<sup>7</sup> attitude, and it offers promotional service for 800,000 customer per day. There are more than 3,000 billers by bill payment service and so forth with Western Union, parcel delivery with Thailand Post and Kerry express and so forth. Besides, Big C directly collaborates with local Thai farmers so as to

<sup>6</sup> FDA is Food and Drug Administration of Thailand.

<sup>7</sup> “Big” refers to a large space that is fully stocked with exceptional services and facilities for customers as well as a large assortment offered to fulfill customer needs. “C” refers to customers who support Big C always.

decrease the cost of transport and expense. Furthermore, Big C has launched and been able to maintain its “price leadership” position for more than 20 years, and still tries to provide Thai people with high quality stuff in lower price.

#### **4.1.3 Efficient Replenishment of Big C**

The third pillar of ECR model is efficient replenishment which arranges products from production line to the retail shelf in fluent and direct way. ECR Thailand is an organization including different manufacturers, retailers and suppliers, and it emphasizes on goods for consumers by optimizing supply chain management. Besides, ECR Thailand encourages to deliver product by collaboration among manufacturers, retailers and stores, which needs to work together to minimize losses along the chain.

Distribution Center (DC)<sup>8</sup> as a bridge, it connects from supplier to customer. Companies should be aware of the distribution costs as to set up an efficient supply chain structure. Rushton (2017) suggest that companies should know the overall supply chain cost is related to the different distribution site options including its numbers, size, type and location. The number of DCs in a distribution network has a positive relation with the cost of DC. In addition, turnaround time is good measure in term of the efficiency of DCs. If company is to increase efficiency, it should speed up its turnaround ratio.

Big C as a member of ECR Thailand, it cooperated with over 3,500 domestic and international suppliers, so the products reach to the accepting area and are transferred straight away to Big C distribution centers or directly deliver to stores that totally get the reduction of stock levels and related administration. In addition, Distribution Center (DC) as a bridge, it connects from supplier to customer. Companies should be aware of the distribution costs as to set up an efficient supply chain structure. Rushton (2017) suggests that companies should know the overall supply chain cost is related to the different distribution site options including its numbers, size, type and location. Big C now runs and operates three distribution centers (Mini Big C DC and Cross Dock DC at Thanyaburi, and Fresh Food DC at Chachoengsao). Moreover, Big C adopt new technologies such as pick-to-light and voice-picking system to improve operation efficiency and pick accuracy. From BJC annual report, Big C has also used dynamic route planning tools, quality control measures for fresh food products. Besides, Big C make advantage of its hypermarket stores and Mini Big C network to increase last mile delivers efficiency. Furthermore, Big C owns in total more than 270,000 SKUs<sup>9</sup> including fresh food, dry food, soft line, hard line, and home line, 97% of which are from local suppliers which afford all kinds of products with related proper price. Furthermore, Big C set up “SME go together” program which organizes and shares knowledge and information with operators of SMEs who are interested in collaborating with Big C as suppliers and partners. The collaboration increases the long-term relationship between Big C and SMEs group. In 2019, there are 137 persons out of 88 companies to take part in this program.

#### **4.1.4 Efficient New Product Introductions of Big C**

<sup>8</sup>A distribution center (DC) is a node in a supply network which can be used for: storing goods (short term or longer), processing products, de-aggregating vehicle loads, creating SKU assortments, assembling shipments, and other things.

<sup>9</sup> A stock-keeping unit (SKU) is a scannable bar code, most often seen printed on product labels in a retail store.

The final pillar of ECR Model is efficient new product introductions, namely it needs to reduce the unnecessary cost of introducing and developing new products. Brown and Bukovinsky (2001) underlined that it is easy to promote and develop new product by success or failure and emphasizes which types of customers most likely to adopt a potential new product by collected consumer demographic data.

In order to develop and introduce new product, Big C adds renovations to promote and develop new products. Big C classifies its renovations into different categories: extension, right sizing, and full renovations. Besides, Big C uses the three renovations to analyze and develop hypermarket's productivity and a more attractive tenant mix. In addition, Big C use the renovations to refresh customer shopping experience and reconfigure stores area layout. Meanwhile, to introduce and develop new products, Big C has launched cooperation with C Smart Solution Company Limited to access customer data for Big C and suppliers as to understand customer categories and preference. Moreover, Big C also affords personalized service by SMS, Line, and mobile application. Therefore, Big C has been developing various technological methods guiding Big C understand customer well to make proper measure and strategies such as promotion analyzers, lifestyle segmentation, and price elasticity.

## 4.2 Analysis in Implementation of ECR Model

### 4.2.1 Analysis of Efficient Assortment

Customer has different segment, so ECR model encourages retail to optimize store assortment and increase inventory turnover. Compared with traditional retail, the one important change is that retail industry focus on customer by efficient assortment. This change needs retail to collect different functional store and diverse products in different ways so that customer won't buy products only by grouping products due to brand or cheap price. Finne and Sivonen (2009) emphasized that retailer should pay attention to link with specific consumer needs with format portfolio which maximize guarantee retailers keep long term profit. Like Big C, it uses store segments and product diversity to sustain revenue increase in every fiscal year. According to BJC annual report, Modern Supply Chain (Big C) reported the total revenues of THB 81,393 million, THB 118,182 million, THB 125,035 million, THB126,904 million in the successive three years from 2016 (Figure 3).

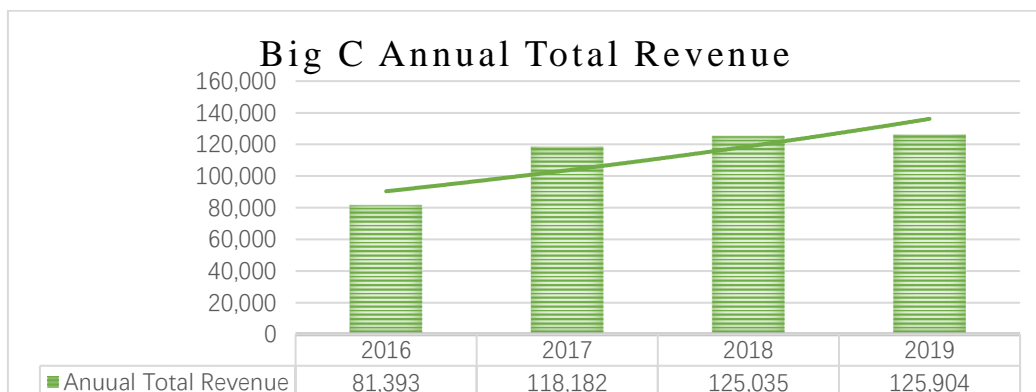


Figure 3: Big C Annual Total Revenue

Sources: BJC Annual Report (2016, 2017, 2018, 2019)

From 2016 to 2019, Big C expanded its 1369 stores in three main segments to fulfill the objects that satisfy customers. From Krungsri Research<sup>10</sup> (2018), it indicated that convenience stores would keep increase compared with other store formats in modern retail field and have occupied the greatest market share from traditional retailers. Among the three main store segments, the number of convenience store is higher than other store segments. Besides, in Thailand retail industry, Big C use hypermarket as a hub connecting with mini Big C to compose retail network so as to meet more and more customer segments. Besides, the number of convenience stores is higher than other supermarket segments because it is the convenient and efficient way for customer to purchase products. Big C still increases its the number of mini Big C to satisfy customer in efficient response even though retail business growth does not increase as in previous years (Figure 4 and Figure 5).

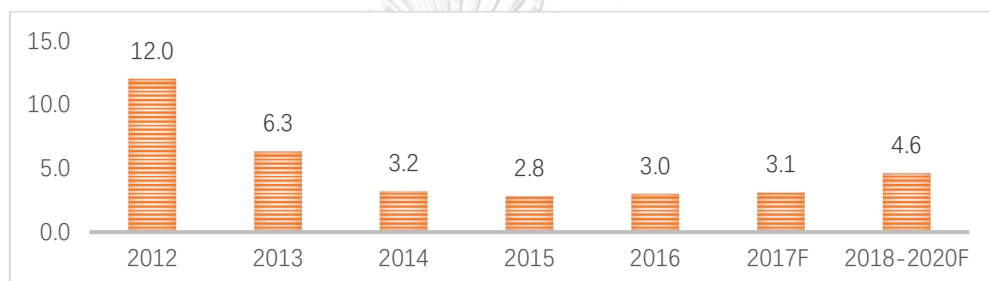


Figure 4: Retail Business Growth in Thailand  
Sources: Thai Retailers Association, forecast by Krungsri Research (2018)

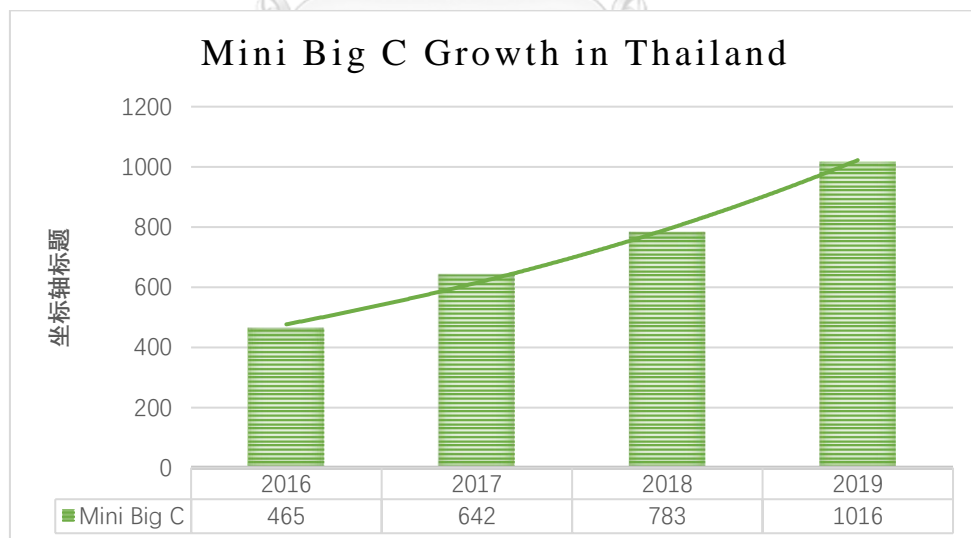


Figure 5: Mini Big C Growth in Thailand  
Sources: BJC Annual Report (2019)

#### 4.2.2 Analysis of Efficient Promotion

Efficient promotion encourages retailer to change its traditional management and

<sup>10</sup> Poonsuk Ninkitsaranont (2018). Krungsri Research: Thailand industry outlook.



balance price-quality-service ratio so that attract customer attentions. Except for assortment, the most of customer are always attracted by price-quality-service compared with only by price level. From Finne and Sivonen (2009), it's a big challenge for retailers are to sustain the competitive ability, offer value-adding services and provide quality with a competitive price in line with customer expectations. Meanwhile, product quality is tangible, and service is intangible, hence both of them are important factor for retailer to attract customer who become returned customer compared with only use cheap price. On the one hand, high quality can be the most important advantage for retailer to be a strong competitor as they strive to keep increase product quality. On the other hand, service is a similar competitive factor as quality is, and good service can provide customer with a viewpoint to getting an outstanding competitive advantage.

As for Big C, quality advantage is more competitive profitability and capability. Big C teams always focus on quality control, it not only ensures product freshness, but also guarantee fresh product safety. Big C has own product safety process to check fresh product from supplier, besides, it also cooperates with supplier (farms) in efficient and close relationship. Except for aiming to satisfy customer, quality cost is lower when retailer establish long term relationship with supplier, as Big C manages to help farmers develop their products. Furthermore, Hines (2004) underlined why retailer normally increase customer service levels? Because this is one-way to keep customer return efficiently. Big C always posts "Big C big service" to provide its customer with numerous and efficient service such as trying to build Big C being one-stop shopping destination.

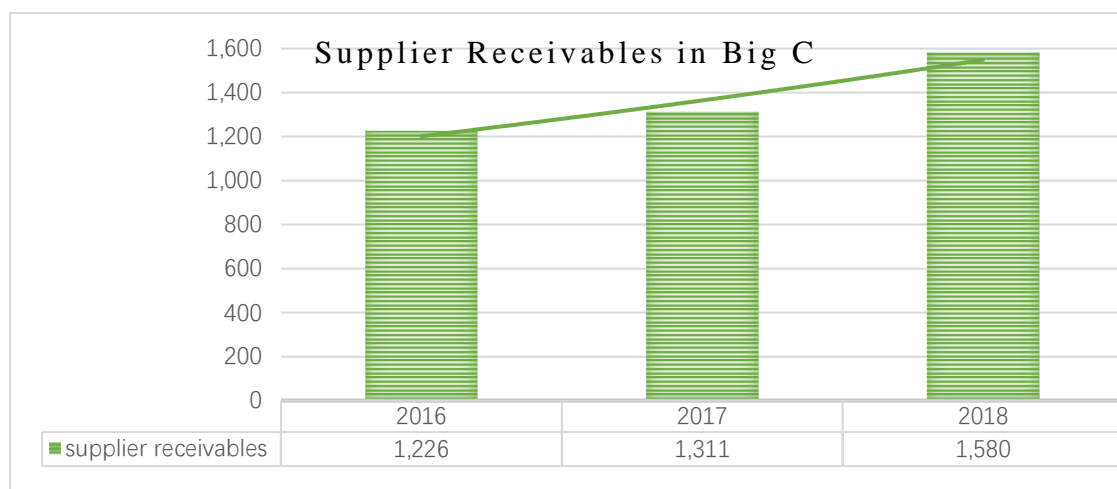
#### **4.2.3 Analysis of Efficient Replenishment**

ECR model call for retailer to collaborate with other suppliers as to increase influent production line. Collaboration can add extra value in supply chain management (SCM) between retail and supplier, such as ECR Thailand that encourage retailer, supplier, manufacture deepen collaborative relationship to increase efficiency of supply chain management in retail field. The objective of supply management is to provide the consumer with the right products, the right receiving place and the right time as efficiently as possible, accordingly, retail can make sure the replenishment of on shelf product. For one thing, the clear-cut standard is built up by some advanced retailer to cooperate with small suppliers who like to follow in interactions. Big C has started to open "SME<sup>11</sup> Go Together" program to create a network and good long-term relationship between SMEs and Big C. For another thing, for local retailer, it would like to cooperate with local suppliers in open mind so as to create shared long-term business goals collaboratively and develop business operations together. Big C carries more than 130,000 SKUs to 270,000 SKUs from 2017 to 2019, and the local supplier keeps more than 97%. Moreover, the amount of supplier receivables and tenant receivables is THB 1,580 million, THB 1,311 million, THB 1,226 million respectively since 2016 (Figure 6).

Except for the supplier, the distribution center has been played vital role in supply chain management. For example, retail distribution center (DC) have influence on the

<sup>11</sup> SME stands for Small and Medium Enterprises. They are also known as small and Medium Enterprises or small and medium-sized businesses (SMBs).

fresh food, as they prepare for orders according to stores. In short, fast-moving distribution center stock stuff with a very rapid reaction (Gustafsson, K., 2009). In addition, it is advised that consolidating stock into fewer locations can eventually reduce total cost, and companies can avoid the cost of national warehouses and merge them into regional distribution centers (RDCs) so as to afford more services in much wider geographical areas (Christopher, M., 2005). In addition, Cross-docking is like a bridge to connect with supply and retail, therefore products get to the specific area and straightly to retail where they are put on shelf so that it dramatically reduces stock levels and associated administration. Big C currently has three own-operated distribution and one outsourcing distribution center which deliver goods from more than 3,500 suppliers.



*Figure 6: Supplier Receivables in Big C*  
*Sources: BJC Annual Report (2016, 2017, 2018)*

#### 4.2.4 Analysis of Efficient New Product Introductions

New product introduction aims to decrease cost and failure of new products. The most successful new product innovations have operated from cooperation by technologies. Technology gathers customer identification as well as analyzes customer data that provides vivid insights in shopper behavior. The analysis may reveal many insights in customer behavior, such as products purchased, buying frequencies, basket sizes and even product-specific price elasticity. Big C work with data analytic company to analyze customer information to track development of their customer portfolio and profitability for segmentation.

IT expertise can also be regarded as a core competency in retailing. Hence, many retailers are not willing to develop IT operations. Daily and easily accessible data on the actual behavior of the target shopper segments enable new product introductions. To make use of different technologies can investigate and develop customer information such as measuring purchase frequencies and brand loyalty in different segments. Big C provided personalized marketing service via SMS, Line, and mobile application.

## **5. Conclusion**

Efficient Consumer Response (ECR) as the common extension of JIT in supply chain management, it was developed in a grocery conducted by Kurt Salmon Associates in the USA (KSA, 1993). ECR Model intends to manage the integrated supply chain and create product in fluent way via the supply chain between retail and supplier by new technology to meet consumer satisfaction efficiently with lower cost. From the previous case study, it shows that ECR Model contains four main pillars including assortment, promotion, replenishment, and new product introduction. On basis of ECR Thailand, retail needs to collaborate with suppliers through new technology and information share when catering to satisfy customer at lower cost. Accordingly, collaboration and information analysis play vital role in increasing efficient ECR Model.

### **5.1 Collaboration**

In order to increase maximum value to the consumer, ECR Model is an approach to build up a intimate relationships between retailers and suppliers in retail field. According to Hines (2004), retailer cooperate with suppliers in goods and services to create a outstanding customer advantage than other competitors. Collaborative ECR Model in supply chain management is important for retailers that arrange to deliver focused products and services for customers which cannot always be achieved the aim of satisfying customer at lower cost independently by a single organization. Therefore, it is a better way to treat customers by required different types of collaborative method: co-operation agreements, technical knowledge operate, strategic alliances, partnerships and so forth. ECR Model aims to improve the efficiency of retail business without an individual way. Moreover, taking the consumer into consideration adds value to supply chain management which is different from other supply chain models only focused on logistics. Hence, as for ECR, it is an important new development adopting collaboration in retail operational business.

In an ideal product replenishment system, all participants in the supply chain have at any time a sufficiently accurate knowledge of how many products are moving or stored at each point in the chain. Therefore, it is important that collaboration partners can quickly deliver accurate information to each other for demand forecasting. Stock levels in the supply chain can be reduced and distribution operations in the supply chain can be simplified so that less time is spent in unnecessary intermediate stages. Efficient product replenishment has been estimated to yield most of the ECR savings, which ensures that the product flow in the supply chain can adapt to the real demand of the customer and reach to the final consumer in efficient way. Furthermore, ECR Model emphasizes the importance of partnerships between retailers and suppliers in the retail supply chain always try to set up a long-term relationship with reliability.

### **5.2 Information share**

According to Waters (2003), ECR model transmits information through the supply chain, and each participant co-operates in moving products to customer efficiently. Accordingly, accurate and quick information must be used to support effective retail business. Meanwhile, it's efficient and profitable for retailers to manage assortment as to be able to unite pieces of information together to obtain an different scene by consumer behavior patterns.

Technological tools form the basis of ECR Model and new efficient operations. Information collected includes the name, brand and price of the product, as well as shopping baskets and shopping times. Information collection offering a practical way of gathering information about customers, have become more common in retail industry. The sales data can also be used to create local assortments in line with consumer needs and in launching new retail segments. Another key area of ECR Model is data sharing. Information systems also enable increasingly accurate cost accounting. Activity-based costing facilitates the modelling of actual costs at all retail value chain process stages and thereby helps in identifying improvement areas or defining new metrics for operational efficiency.

## **6. Recommendation**

From the case study and analysis, ECR Model in retail supply chain has better value and efficiency, and profitable business partners are key to arranging the supply chain, besides, information share is to ensure supply chains are quick response to customer demands. In order to improve efficient ECR Model in retail supply chain, it recommends increase the following management.

Firstly, optimizing the store shelf and diverse assortments with great flexible space allocation. Besides, the focus of the store and product assortment shifts from basic assortments towards impulse purchases and enhancing shopping experiences, and systematic changes in assortments and themes add necessary variation to shopping. Moreover, assortment of shop formats and product help retailer fulfill the objective of customer satisfaction.

Secondly, in addition to national chain assortments, retailer could deepen coordination with global retailers and suppliers, so the diverse assortment management will add more value to supply chain in order to increase the replenishment. Meanwhile, in order to increase the efficiency of supply chain, the future retail supermarket will keep close with customer, and it will adopt new social media to promote its products as to attract different customer segments.

Thirdly, trying to improve product quality and service quality. In order to improve product and service qualities, it is achieved via innovation and the adoption of customer-focused strategy whereby the guarantee of quality in production and service results in improvements to the final goods or services. The customer's focus shifts to reliability and reputation when making choices by comparing the different competitor offerings.

Fourthly, it is important for retailer to build up a quick response supply chain in retail field. Responsive retailer can be able to deliver product to on shelf or provide services that have higher demand than expected. Besides, quick response retailers can decrease cost and gain extra revenue by 'satisfy customer in right time and in right place'.

Fifthly, it is useful to collaborate with alliance in long relationships as to remove

business barrier and enhance the level of sharing of knowledge, resources and experience. Furthermore, it provides a better schedule to minimize cost and save much time to result in a better asset utilization.

Finally, it should increase the ability of innovation in supply chain management. Innovation will continue to be strong keys for success, so retailers should extend their brands to new service concepts and solutions for customers. There are many ways to support the consumer with value-added services closer to the point of consumption, and most product innovations will be concentrated on assortment as to be leveraged externally and is suitable to brand extensions.



## REFERENCES



จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**

- Ayers, J. B. (2006). *Handbook of supply chain management*. CRC Press.
- Brown, T. A., & Bukovinsky, D. M. (2001). ECR And Grocery Retailing: An Exploratory Financial Statement Analysis. *Journal of Business Logistics*.
- Brockman, B. K., & Morgan, R. M. (1999). The evolution of managerial innovations in distribution: what prospects for ECR?. *International Journal of Retail & Distribution Management*.
- Christopher, M. (2005). *Supply chain and supply chain management: creating value-adding networks*. Harlow, England: Prentice Hall/Financial Times.
- Ellram, L. M. (1996). The use of the case study method in supply chain research. *Journal of business supply chain*, 17(2), 93.
- Finne, S., & Sivonen, H. (2009). *The retail value chain: How to gain competitive advantage through Efficient Consumer Response (ECR) strategies*. London: Kogan Page.
- Fernie, J., & Sparks, L. (2019). *Supply chain and retail management: emerging issues and new challenges in the retail supply chain*. London: Kogan Page.
- Gustafsson, K. (2009). *Retailing supply chain & fresh food packaging: managing change in the supply chain*. London: Kogan Page.
- Goh, M., & Pinaikul, P. (1998). Supply chain management practices and development in Thailand. *Supply chain Information Management*, 11(6), 359–369.
- Golicic, S. L., Davis, D. F., & McCarthy, T. M. (2005). A balanced approach to research in supply chain management. In *Research methodologies in supply chain management* (pp. 15-29).
- Kotzab, H. (1999). Improving supply chain performance by efficient consumer response? A critical comparison of existing ECR approaches. *Journal of Business & Industrial Marketing*.
- Hines, T. (2004). *Supply chain strategies*. London: Routledge.
- Kurnia, S., & Johnston, R. B. (2001). Adoption of efficient consumer response: the issue of mutuality. *Supply Chain Management: An International Journal*.
- Rushton, A., Croucher, P., & Baker, P. (2017). *The handbook of supply chain and distribution management*. London, United Kingdom: Kogan Page.
- Reyes, P. M., & Bhutta, K. (2005). Efficient consumer response: literature review. *International journal of integrated supply management*, 1(4), 346-386.
- Seuring, S., Müller, M., Reiner, G., & Kotzab, H. (2005). Is there a right research design for your supply chain study?. In *Research Methodologies in Supply Chain Management* (pp. 1-12).

- Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R., & Samson, D. (2002). Effective case research in operations management: a process perspective. *Journal of operations management*, 20(5), 419-433.
- Yin, R. K., & Campbell, D. T. (2018). *Case study research and applications: Design and methods*. Thousand Oaks, CA: SAGE Publications.
- Walters, D. (2006). Demand chain effectiveness – supply chain efficiencies. *Journal of Enterprise Information Management*, 19(3), 246–261.
- Walters, D. (2003). *Supply chain: An introduction to supply chain management*. Palgrave Macmillan.





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