การพัฒนาคลังกระจายสินค้าสาธารณะในประเทศไทย
กรณีศึกษาสำหรับสินค้าอุปโภคประจำวัน

นางสาวคนยา ฉันธนะเลิศวิไล

วิทยานิพนธ์ฉบับนี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรมหาบัณฑิต
สาขาวิชาการจัดการทางวิศวกรรม ศูนย์ระดับภูมิภาควิศวกรรมระบบการผลิต
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2542
ISBN 974-333-538-2

DEVELOPMENT OF PUBLIC DISTRIBUTION WAREHOUSE IN THAILAND : A CASE STUDY COMPANY FOR DAILY USE CONSUMER PRODUCTS

Miss Danaya Chantanalertvilai

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Engineer in Engineering Management
The Regional Center for Manufacturing Systems Engineering
Faculty of Engineering
Chulalongkorn University
Academic year 1999
ISBN 974-333-538-2

Thesis Title	Development of Public Distribution Warehouse in Thailand: A case study company for daily use consumer product
By	Miss Danaya Chantanalertvilai
Department	Engineering Management
Thesis Advisor	Asst. Prof. Rein Boondiskulchok

Accepted by the Faculty of Engineering. Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

.....Dean of Faculty of Engineering

(Associate Professor Tatchai Sumitra, Dr. Ing.)

THESIS COMMITTEE

.....Chairman

(Professor Sirichan Thongprasert, Ph.D.)

.....Thesis Advisor

(Assistant Professor Rein Boondiskulchok, D.Eng)

.....Member

(Associate Professor Chuvej Chansa-ngavej, Ph.D.)

ดนยา ฉันธนะเลิศวิไล : การพัฒนาคลังสินค้าสาธารณะในประเทศไทย : กรณีศึกษาสำหรับสินค้าอุ)โภคประจำวัน (DEVELOPMENT OF PUBLIC DISTRIBUTION WAREHOUSE IN THAILAND : A CASE STUDY COMPANY FOR DAILY USE CONSUMER PRODUCTS) อ. ที่ปรึกษา : ผ.ศ. ดร. เหรียญ บุญดีสกุลโชค, 113 หน้า. ISBN 974-333-538-2

กระบวนการในการกระจายสินค้าที่ผลิตเสร็จแล้วจากผู้ผลิตไปยังผู้บริโภคขั้นสุดท้าย (Physical Distribution) มีการพัฒนาที่นี้ทำให้เกิดการเปลี่ยนแปลงในกระบวนการต่างที่เกี่ยวข้อง รูปแบบของคลังสินค้าสาธารณะก็เป็นหนึ่งในวิธีการกระจายสินค้าซึ่งน่าสนใจและมีประโยชน์ในการนำมาใช้ในประเทศไทย วิทยานิพนธ์ฉบับนี้ได้นำเสนอการออกแบบหลักการของรูปแบบและกระบวนการหลักโดยรวมของคลังกระจายสินค้าสาธารณะ ในการออกแบบกระบวนการเหล่านี้ ได้ทำขึ้นจากการศึกษากระบวนการกระจายสินค้าของกลุ่มผู้ผลิต ผู้ขาย และผู้ให้บริการด้านการกระจายสินค้า นอกจากนี้ยังได้มีการศึกษาเปรียบเทียบกระบวนการกระจายสินค้าในอดีต ปัจจุบัน และ รูปแบบที่จะเกิดขึ้นในอนาคต จากนั้นจึงได้ทำการออกแบบกระบวนการทำงานของคลังกระจายสินค้าสาธารณะให้กับบริษัทกรณีศึกษา ขอบเขตให้บริการจะประกอบไปด้วย คลังสินค้าสาธารณะ การรวบรวมสินค้าก่อนการขนส่ง คลังสินค้าย่อย การขนส่งสินค้า ตลอดจนการบรรจุหีบห่อ นอกจากนี้ยังได้มีการวิเคราะห์ข้อจำกัดเพื่อรวบรวมหลักในการปฏิบัติงาน และสรุปคุณประโยชน์ และข้อด้อยของกระบวนการที่ได้ออกแบบในวิทยานิพนธ์ฉบับนี้ด้วย

ภาควิชา ศูนย์ระดับภูมิภาคทางวิศวกรรมระบบการผลิต	ลายมือชื่อนิสิต.....
สาขาวิชา การจัดการทางวิศวกรรม	ลายมือชื่ออาจารย์ที่ปรึกษา.....
ปีการศึกษา 2542	ลายมือชื่อที่ปรึกษาร่วม.....

4171606221: MAJOR ENGINEERING MANAGEMENT
KEY WORD : LOGISTICS/WAREHOUSING/DISTRIBUTION
DANAYA CHANTANALERTVILAI: DEVELOPMENT OF PUBLIC DISTRIBUTION WAREHOUSE IN THAILAND : A CASE STUDY COMPANY FOR DAILY USE CONSUMER PRODUCTS. THESIS ADVISOR: ASST. PROF. REIN BOONDISKULCHOK , 113 pp. ISBN 974-333-538-2

Development of physical distribution creates change of its operation requirements. Public distribution warehouse is analyzed as future operation of physical distribution in Thailand. To determine conceptual design operation of them, the first consideration is in existing physical distribution operation of logistic & distribution and operation survey of manufacturer, retailer and logistic distribution providers in Thailand. Moreover, before developing conceptual operation and performance of public distribution, development of physical distribution is analyzed including its operation in past, present and future. Then, scopes of service for case study company are determined that consist of public warehousing, consolidating, regional warehousing, transportation and packaging. Furthermore, constraints, principles of performance and advantages and disadvantages of conceptual design for case study company are determined.

ภาควิชา ศูนย์ระดับภูมิภาคทางวิศวกรรมระบบการผลิต ลายมือชื่อนิสิต.....

สาขาวิชา การจัดการทางวิศวกรรม ลายมือชื่ออาจารย์ที่ปรึกษา.....

ปีการศึกษา 2542 ลายมือชื่อที่ปรึกษาร่วม.....

Acknowledgements

The author wishes to express her profound gratitude to advisor, Asst. Prof. Rein Boondiskulchok, for his advice and encouragement during period of study. Grateful thanks are extended to Prof. Sirichan Thongprasert and Associate Prof. Chuvej Chansa-ngavej for their suggestions and serving as members of the examination committee.

Special acknowledgement is accorded to Mr. Kriengsak Sangthong, Mr. Surasit Sirisompop, Mr. Somchai Songsakdccha and Mr. Vitit Thcrasan for giving opportunity to carry out the study and for their helpful guidance.

Specially thanks are due to Sahachoke Transport, their cooperation are really a great asset for the author.

Finally, greatest gratitude is due to her beloved father and mother for their moral support and inspiration.

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CHAPTER 1
INTRODUCTION OF THESIS

1.1 General Background

For any industry , There are many steps in manufacturing process to turn raw materials into a product. However, before such process could take place, raw materials at the place of production must be completely available. Moreover, after manufacturing process, finished goods must be distribute to customer on time. For those reason, important to the manufacturing process is the logistic distribution of raw materials and the finished goods to consumers.

In the process of producing any products, logistics is concerned around business operation. Most of the business operations start with forecasting the demand of the products and then producing and sale to customers. The logistic operations can be divide into three areas: procurement, manufacturing support, physical distribution. The elements of the business operations and also the logistic operation represent by the flow diagram as follows

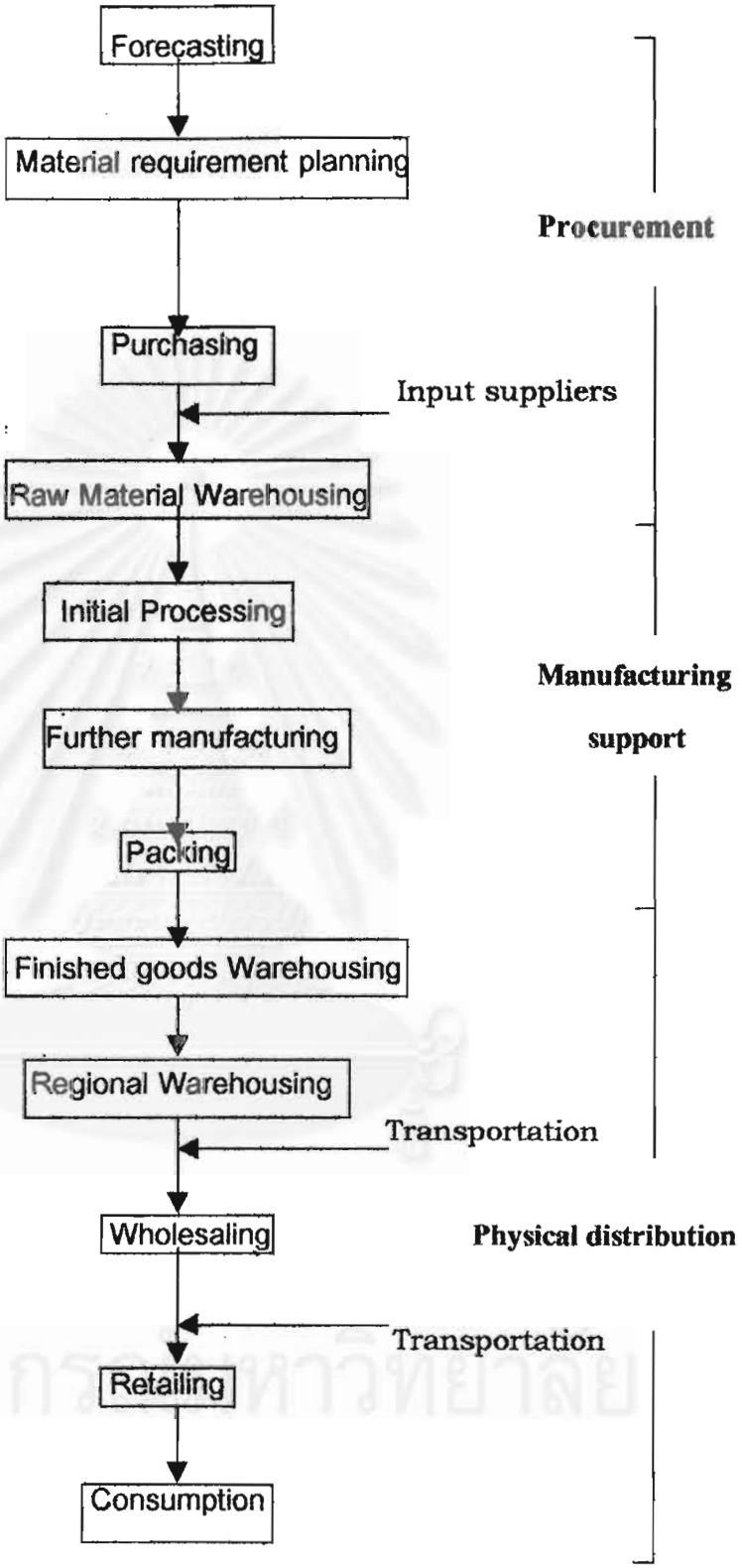


Figure 1.1 Business Operations Flow Chart

The process of physical distribution can be provided by the company warehouse or using the service of public distribution warehouse to stock the finish goods and carrier in transporting product.

However, when the companies provided the facilities for stock keeping and finish good distribution, they have to spend a lot of money in warehousing and transportation. To operate warehouse, the firm needs to invest in warehouse and transportation facilities. Also, because of the different locations of customers, distribution could be very expensive if business operator have to pay full - time cost for a truck for delivery of goods to a few customers living at a distant. Also , The truck may not be fully loaded. Moreover, it will be a waste of money if many companies have to separately deliver goods to the same place as the follow figure

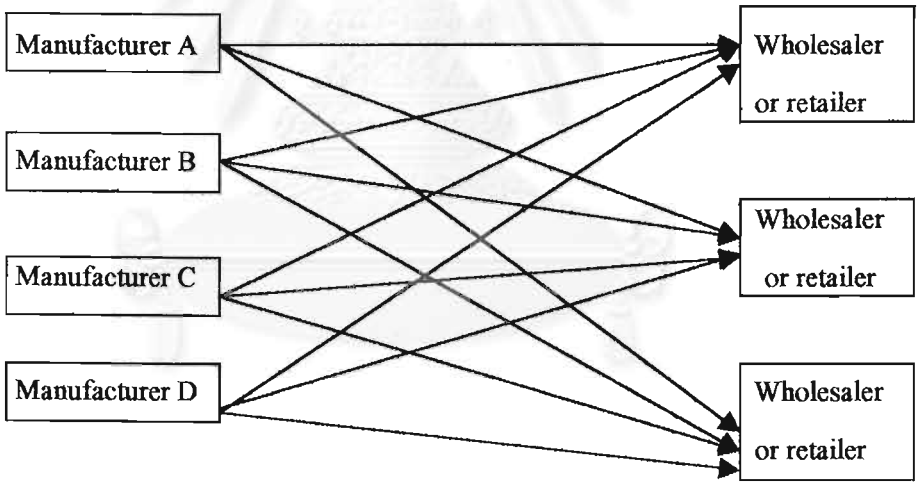


Figure 1.2 Traditional way of distribution process

Therefore, trend of warehousing and distribution in the future was developed. The public warehouse is widely used for economic of scale. Warehouse will not be only stocking place, but it also be distributing point and value-added center. Many firms make

decision to use the service of public distribution warehouse in order to minimize cost of the physical distribution process. The general operation of public warehouse are as follow:

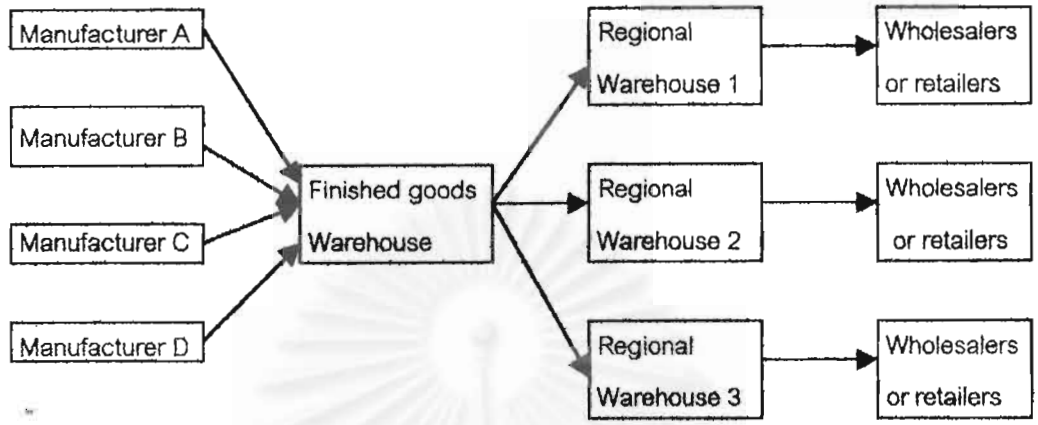


Figure 1.3 General operation of public warehouse

There are many public distribution warehouses in several foreign countries but in Thailand, this kind of business not very successful yet.

The case study company has been in public transportation, would like to develop the company as public distribution warehouse. At the present, the company provides transport service for the Northern region of Thailand. The intended scope of the company's services include

- Transporting goods from Bangkok to various locations in northern region.
- Stock – keeping for deliver to customers in town as well as in rural areas.
- Warehousing and stock management.

The company has regional warehouses in many provinces such as Chiengmai, Chiengrai, Lampang, Phayao, Phisanulok, Phare etc. At present the customers of the company consist of Lever Brothers (Thailand), Nestle products (Thailand), Colgate Palmolive, Thai industry milk etc.

1.2 Statement of Problem

The problem is the company would like to develop its scope of services to be public distribution warehouse for its clients with its current facility. Therefore, conceptual operation need to be modified base on its facility and nature of business.

As the intended scope of the company's service, they are not fulfilled yet. The common operation of the company can be determined by the flow chart as figure 1.3.

Operation survey and analysis of physical distribution are firstly needed to design conceptual operation of public distribution warehouse.

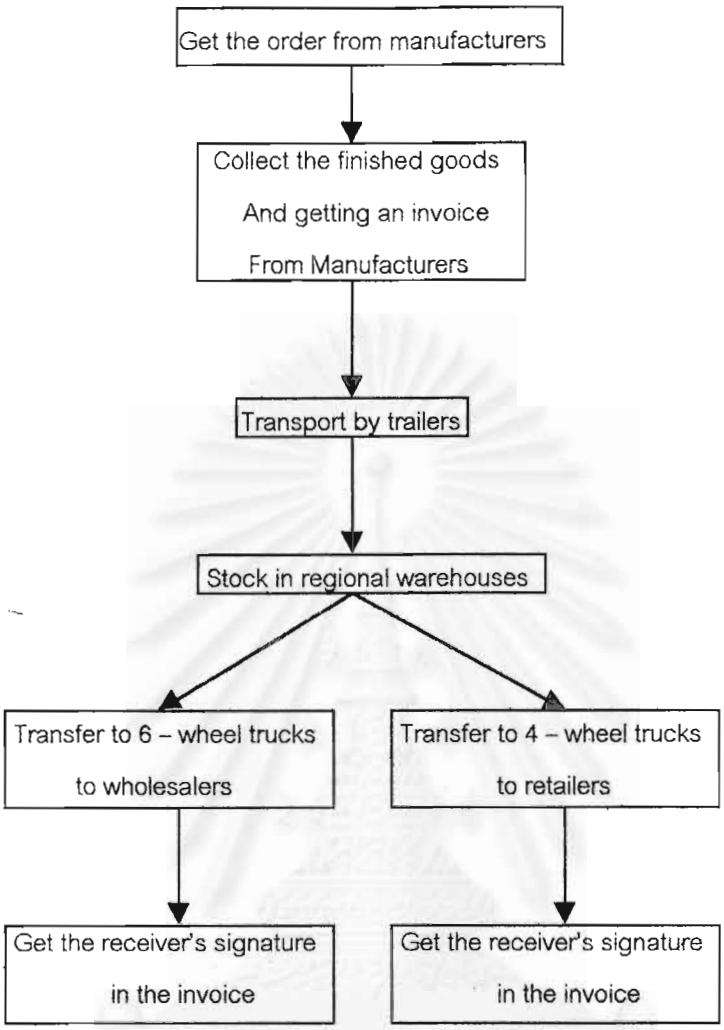


Figure 1.4 Current operation of case study company

1.3 Objective of the research

The objective of the research is to study the development of physical distribution and the public distribution warehouse also to determine the appropriate operation for the case study company.

1.4 Scope of the research

1. Survey existing logistic operation in Thailand
2. Survey physical distribution operation
3. Analyze market study to determine a feasibility of the public distribution warehouse
4. Analyze development of physical distribution operation
5. Define constraints of the public distribution warehouse
6. Define scopes of supply for a case study company based on current warehouses and transportation facilities and current clients
7. Determine important factors for the case study company i.e.
8. Determine advantage and disadvantages for operational process design

1.5 Methodology of the research

1. Study related literature.
2. Collect public distribution warehouse information from Internet world wide web and journal
3. Analyze current service, warehouse and transportation facilities of the case study company
4. Interview with concerned officers of both manufacturer and wholesaler companies in Thailand in order to analyze a market and appropriate factors of the public distribution warehouse
5. Analyze all of the collected information.
6. Design an operational structure of a public distribution warehouse in Thailand for the case study company.

7. Evaluate by comment of current clients of the case study company.
8. Summarize the advantages and disadvantages of designed model

1.6 Expected results

This research was expected to develop a model of public warehouse with appropriate structure for the case study Company.

CHAPTER 2
LITERATURE REVIEW

2.1 Theory Consideration

2.1.1 Logistic Management

logistic is to get the right goods or services the right place at the right time, and in the desired condition, while making the greatest contribution to the firm. The business logistics comprise a physical supply, which refers to the time and space gap between a firm's immediate material sources, its processing point, and physical distribution.

According to Donald J. Bowersox and David J. Closs from Logistic management: integrated supply chain, logistics system fundamentals in consist of following component.

- Network design

  This is a primary responsibility of logistic management since a firm's facility structure is used to provide products and material to customers. The net work design requirement is to determine the number and location of all type of facilities required performing logistic work.

- Information.

  The fast and accurate communication improves logistic performance. In addition, information related to order processing, the processing of incorrect order creates all the cost of logistics. The benefit of fast information flow is directly related to balance of work procedures.

- Transportation.

  Its requirement can be accomplished in three basics ways. First of all. A private fleet of equipment may be operated. Second, contracts may be arranged with transport specialists. Third, an enterprise may engage the services of wide variety of carriers that provide different transportation services on individual shipment basis. These three forms of transport are typically referred to as private contract, and common carriage. From the logistic system viewpoint, three factors are fundamental to transportation performance: cost, speed, and consistency.

- Inventory.

  The inventory requirements of a firm depend on the network structure and the desired level of customer service. Theoretically, a firm could stock every item sold in facility dedicated to service each customer. Few business operations could afford such a luxurious inventory commitment because the risk and total cost would be prohibitive. The objective to achieve the desired customer service with the minimum inventory commitment, consistent with lowest total cost.

- Warehouse.

  Warehousing management concentrate on evaluation of warehousing function, warehouse location and method to management and control. When warehouses are required in logistic system, a firm can choose between obtaining the services of specialist or operating its own facility.

- Material handling and packaging

  Material handing refers to those activities of loading and unloading, moving the product to and from carious locations within the warehouse.

2.1.2 Logistic Performance Cycle

According to Donald J. Bowersox and David J. Closs from Logistic management: integrated supply chain, fundamental of performance cycle consists of three logistical performances. First is physical distribution cycle. The second is manufacturing support cycle. Third is procumbent cycle. Logistic integrates performance together by communication and transportation. Links of logistic performances are illustrated as follow:

Physical distribution

Physical distribution concerns movement of finished product to customer who is the final destination. This process links firm with customers. It provides timely and economical product availability.

Manufacturing support

The area of manufacturing support concentrates on managing work – in process inventory as it flows between stages of manufacturing.

Procurement

Procurement is concern with purchasing and arranging in bound movement of materials, parts and/or finished inventory from suppliers to manufacturing or assembly plants.

2.1.3 Marketing Environment

Marketing environment can be analyzed by concern following 4 environmental variables.

- The economic environment

  The economic environment affects marketer directly. Important variables of economic environment are such as GDP trends, interest rate, inflation rate, energy availability and cost etc.

- Technological Environment

  Technological environment has an impact on industries. Important variables of this environment are such as total government spending for research and development, new technology developments, development of robotic and automation, information technology availability etc.

- Political-legal Environment

  Political-legal environment has affected every industries and business firms. Important variables of this environment are such as laws, regulations, tax laws, stability of government etc.

- Sociocultural and ethical environment

  Important variables of sociocultural environment and ethic are such as consumer activism, attitudes and beliefs, expectation, growth rate of population etc.

2.1.4 Information Technology

Information technology is the technology that merges the computer technology and communication technology to carrying and linking the data. To develop the

system, the firm has to operate software, hardware and communication network to record and carrying data.

- Hardware

  Hardware consists of all machinery and equipment that are used to operate in computer system such as CPU (central processing unit), keyboard bar-code scanner, printer etc.

- Software

  Software is divided into application software and system software. Application software is developed to perform specific tasks or solve particular problem such as word processing program, spread sheet program, warehouse management program etc.

- Communication

  Communications is used to transfer data electronically from one place to another.

2.2 Literature Survey

Logistical Management : The Integrated Supply Chain Process
Donald J. Bowersox and David J. Closs
McGraw-Hill, First edition, 1996

This book reviews logistic operation integration that logistic competency is achieved by coordinating of five components, which are network design, information, transportation, transportation, inventory and warehouse.

Moreover, in this book, the integrated logistic concern logistic operation of three areas: Physical distribution, manufacturing support, and procurement:

Business logistic Management
Ronald H. Ballou
Prentice Hall, Third edition, 1992

This book defined that the mission of logistic is to get the right goods or services the right place at the right time, and in the desired condition, while making the greatest contribution to the firm. The business logistics comprise a physical supply, which refers to the time and space gap between a firm's immediate material sources and its processing point, and physical distribution, which refers to the time and space gap between the firm's processing points and it customers.

The logistics system fundamentals in the book consist of order processing and the information system, the transportation system, the storage and handling system.

Management of Physical Distribution and Transportation
Chales A. Taff
IRWIN, Fifth edition, 1972

In this book, the components and interfaces of physical distribution include transport system elements and management, inventory control, warehousing management, make or buy decisions, order processing, industrial packaging, material handing and location analysis.

Contemporary Physical Distribution & Logistics
James C. Johnson, Donald F. Wood
Macmillan, second edition, 1984

This book represent warehouse distribution center, which is virtually synonymous with warehouse since most goods in a warehouse are in somebody's distribution system, physical distribution and logistic system analysis and design and

analyses that can be use to provide effective distribution such as customer profitability analysis, warehousing productivity analysis etc.

Flexibility for the future in warehouse design
Tompson Brockmann, Patty Godin, IIE Solutions, volume 29, July 1997, p 22-25

The paper presents factors in designing a flexible warehouse to be able to keep up with changes of demand to remain competitive. Flexibility must be designed into every function of the warehouse that include receiving, material handling, storage, picking and sortation, shipping, labeling and packaging, the warehouse management system and personnel.

Seven Trends of Highly Effective Warehouses
David R. Olson, IIE Solutions, Volume 28, February 1996, p 12-14

The paper considers the 7 trends of highly effective warehouses for roles of warehouse in the logistics and supply chain. The seven trends that will take industry into the next century include focusing on the customer, consolidating operations, continuous flow of material and information, emphasis on value-added services, the application of information technology, space compression and time compression.

How to lanch a successful warehouse management system
Ken Finkel, IIE Solutions, Volume 28, February 1996, p 16-20

The paper consists of threes important points about how to launch a successful warehouse management system. First, warehouse management system must be purchased and built with people throughout an organization. The system should be considered carefully base on nature of business and customers. Second, an

involvement with people throughout the organization is required. Third, it should take time to understand what it needs in system and what can realistically be expected.

Transportation industry takes the right-of-way in the supply chain
Jan O. Spalding, IIE Solutions, volume 30, July 1998, p 24-28

Warehouse and distribution process of the transportation industry commands respect under its working title of logistics management. Whit the right system in place - whether in is an in-house information integration system, an outsourcing system, or a combination – distribution personnel can tackle questions they previously never had the time for: how to build leverage with both customers and carriers.

Three warehouses for the future
Allen Pinkus, IIE Solutions, volume 29, July 1997, p 20-21

The paper considers next generations of technology that will refine the existing technology. It represents three district kinds of distribution center. First is transfer point which is involve distribution and logistic for non-stop movement. Second is customizer, which is final touches place. Third is value-added center which is the place where value is added to an already finished product by barcode, label, tag etc. Then, warehouse in the future is improved. Predictive information will become more accurate. Inventory management software will improve distribution requirements planning and order point systems. A new generation of automatic identification equipment will carry much more information.

Achieving Maximum Supply Chain Efficiency
Jack Chen, IIE solution, June 1997, p 30-35

Maximum supply chain efficiency requires close relation ship between suppliers and buyers. Beside suppliers and buyers, others constituencies in supply chain, which include freight forwarders, transportation service provider and third-party logistics, need open communication and trustful relationship. Also, the paper include two streams of acquisition activities, which are plan and coordination, supply chain cost components and drivers, economic quantity of the supply chain , alignment of supply chain economic quantity, Synchronization of the delivery quantity and responsibility and control along the supply chain.

Evolution of Academic Concern with Transportation and Logistics
Martin T. Farris, Transportation Journal, fall, 1997, p 42-50

The paper concern logistic evolution. The term of physical distribution management appeared in the 1960s. Then, physical distribution attends turned to be place, one of 4P's in marketing. Currently, logistic concern with traffic management, transportation economics, which inventory control and purchasing are added. Also logistics concern about marketing.

Moving small shipments quickly can mean big payoffs distribution centers
Deborah Catalano Ruriani, Contribution Editor, www.warehousing.com, February, 2000

Distribution center change storage system to meet customer. The trend of shipment trend to get smaller and move more frequently. Especially, the shipment is going to meet need of e-commerce that trend to be used widely. Shipments and distribution will be for smaller orders and must be quickly and accurately. Moreover, in any industries, companies trend to hold lower inventory.

Warehouse management systems won't wait
Christoper Trunk, Material Handling Engineering, Volume 50, June 1995

The warehouse management system is use for optimization of handling inventory, flow of information and human resource in warehouse. Guide of selection for appropriate warehouse management system is presented. The warehouse management system is one tool to gain competitive.

Public warehouse
Carolyn Gianforte, Annual International Conference Proceedings, Fall 1993, p 225-227

The paper provide development of strategic alliances between manufacturing and public warehousing. The manufacturers have to survive in business by deliver products at the right time, to the right place, in the right condition, and in the most cost-effective manner. Tyopes of tailored valud-added services available, contracts currently used and pitfalls are discussed.

Retail warehousing and distribution
Deb Navas, ID system, volume 15, November 1995

Cross docking is implemented with involvement of merchandisers, Quick response and moving product through the distribution center rapidly are discussed. Grocery industry does more warehousing and picks operation. Warehousing and distribution practices offer some significant differences in product beyond grocery and general merchandise retailers.

Logistic engineering and management
Benjamin S. Blanchrd, Prentice hall, Third edition, 1986

The book provide logistic system and development process by concern supportability of system. The planning emphasis on logistics early in the system life cycle. Logistic engineering and management are explained. The reliability, maintainability, application of statistic techniques in logistics is covered. Also, principles of logistics to system life cycle with identification of needs are provided. The management overview is discussed.

Logistic of a distribution system
Peter and Nigel Attwood, Gower, 1992

The book focuses on distribution system, which is an important performance of logistic management. In this book, logistic system consists of location warehouses, model of transportation, communication, information processing, product avalibility, service reliability and type of products. Also, functions of distribution are concern as well as cost of distribution.

Distribution network modeling
Maida Napolitino, IIE Solution, June 1997, p 20-24

The paper present study of network to reduce distribution cost, the nature of distribution network studies, which are for reduce cost and improve customer service. Also, the guidelines for network study consists of define a specific objective and scope, simplify intelligently, exercise care in determining the correct transportation rates, validate the model, remember that the answer provided by location models is never the final answer, do not ignore peripheral supply chain issues tha may affect the network solution, and investigate features of the software.

Why Thai Logistic System Does Not Go Further Than The Starting Point

Siam Turakit newspaper, 12 September, 1997

What has been holding back the logistic system?

The reason why Thai logistic is not really success is because lack of trust among each other. They do not really understand the concept of the logistic system yet. Therefore, there is no company ready for "supply chain". Then the ECR target in Thailand has not started yet even though they are financial ready.

Trading companies have been trying to develop their system and try to merge with Thai retailer system, which is a problem to logistic system such as low cooperation between each other, and looking at only their benefit.

These traders try to do logistic system because they know it is very beneficial for customers and themselves. But it goes very slow when they really start doing that and only do with retailers who are already in good system such as having good shipping tools, stock system, and software. Because the product of retailers who use logistic system need these as part of their success, they will not get expected result since these customers are not ready. Moreover, traders who invest in logistic system still can't make their customers feel that the logistic system can't help them reduce cost of production.

The way to solve the problems.

According to the director of logistic club, the club has try to set two standards for logistic system which are bar code usage and EDI or Electronic Data Interface to bring Thai logistic to national standard. They have to pass the first step, which is getting everyone in the organization to understand the system and look at what they

will get from the system since the biggest problem is the lack of human resources that really understand the system.

CHAPTER 3
SURVEY FOR PUBLIC DISTRIBUTION WAREHOUSE IN THAILAND

In this chapter, related information about physical distribution and public distribution warehouse is collected and analyzed. At fist, information of logistic provider who provide services of physical distribution in Thailand is collected from publish source. Then, physical distribution process is analyzed and determined elaborately in view of manufacturers, resellers, and logistic providers. Such information is from interviewing with persons who concern in process of physical distribution. Moreover, information of public distribution operation in foreign countries is collected from Internet. Furthermore, market survey is analyzed to determine feasibility of this business in Thailand.

3.1 Background of Logistic Management Business in Thailand

Nowadays, the competitions in businesses become intensive. Beside a quality of product with reasonable price and many type of promotion, the distribution of the products is considered in many businesses in order to gain more profit. Then, logistic has been performed to many businesses to improve the product distribution, delivery time and reduce transportation delay and cost.

In Thailand, logistics has been performed for 5-6 years ago. The first logistic and distribution company applied logistics by joint venture with an Australian Company to establish a logistics distribution organization in Thailand. The company collected from many suppliers and distributes them to brunches of Central department stores in each region.

Then, some trading firms establish logistic distribution center in order to improve their trading business by efficient distribution. At the beginning, most of the companies that provide logistic management were established as joint ventures of many foreign companies. The facilities were provided with very high investment. Many distribution centers and depot were built in many regions. After the economic recession, a growth of the trading business trends to fall. The trading companies turn to focus in logistic distribution business and provide services as third party companies.

In addition, some manufacturers try to implement logistic and supply chain whether by themselves or subcontract companies in order to improve their distribution service. The medium size logistic distribution companies were established to provide logistic management. Some of them have been developed from transportation business or warehousing business. There are many local companies provide logistic management as third party, not depend on any company directly.

At present, the logistic management business can be separated in to three types by using the objective of the companies. Those are determined as follow:

1. The logistics that is implemented by manufacturer companies in order to increase their distribution service. The companies are such as Saha group, Nestles products etc.
2. The logistic that is implemented by retailers and modern trade in order to improve the distribution of products from supplier to their shop or supermarket. The companies are such as Big C, Top and Lotus super center etc.
3. The logistic that is implemented by public distribution companies in order to provide the service as Third Party Company. Some companies developed from trading such as Inchape, EAC etc. Some

company developed from transportation company such as TNT, TSW, Raumthavorn etc.

3.2 Existing Logistic Management Business Situation in Thailand

The following information is collected from the published documents that available in Thailand about the existing logistic providers. The information include history, range of service, facilities and some of their customer. Also, scope of supply of each company is determined as well.

3.2.1 David Distribution (Thailand)

The David Distribution (Thailand) company is established by joint venture between David investment co., Ltd., Australian Company, and Central retail Thailand. The company had been performed logistics and establishes distribution centers to distribute the goods to each branch of central department stores. The Central retail (Thailand) has realized that the logistics in very useful in long term in order to reduce distribution cost and improve the transportation delay. After applying logistics by the Central retail (Thailand) Co., Ltd., logistic management has been widely performed in many companies.

The service of the company was distribution of goods from the distribution center in Bangkok to central region and east of Thailand. In the north, northeast and south, the company cooperates with EAC logistic Co., Ltd. because EAC has many depots in regional area.

3.2.2 East Asiatic Company Limited

East Asiatic Company (EAC) is a subsidiary company of Denmark company. The company had been in trading business by getting goods from foreign countries to sale in local market. The core business of the company is chemical products. In 1994, the company invested in transportation and warehousing business by established EAC logistic (Thailand) Co., Ltd. in order to implemented logistics in their services. The company us logistical competency in order to improve its delivery time for efficient of the distribution. After the economic recession, the company increases its focus on the logistic management business rather than its trading business and provides the service to others companies as third party.

The company expanded the warehouse to 20000-meter square. Also, it has strong distribution network. There are 8 warehouses in many regions such as Lumpoon, Konkhen, Pisanulok etc. There are 20 trucks, 120 trailer. In addition, the company improves its information technology system with computer network. Moreover, the company improved its services area by cooperates with TSW distribution company in some region of Thailand. The core business of the company is provide a trading and distribution service for chemical product and consumer product for local band as well as international band. Moreover, the company planed to provide the service for food products and invested in chilled goods warehouse and distribution facilities.

However, after the economic crisis, EAC (Thailand) co., Ltd. lost its capital about 99 million bath that include the lost from EAC logistic about 45 million bath. Therefore, at present, 1999, the EAC logistic is took over by a Swedish company.

Scope of supply

- Trading a chemical ad consumer product

- Finished good distribution with strong distribution network
- Warehousing
- Contract warehousing

3.2.3 Inscape Co., Ltd.

Inscape is a subsidiary company of Inscape PLC Co., Ltd., an English company. At first, the company was the trading firm in consumer marketing. The company has been in trading business more than 140 years. Then, the company implemented logistics management and distribution for its trading business.

Since 1997, the trading business has suffered by the economic crisis. The company consolidated the chain companies, which include Inscape consumer marketing, Inscape health care and Inscape logistic, to be the Inscape consumer logistic. The company focus on the logistic management business and invested in warehousing and information technology. Now, the company provides this service as third party company. Moreover, the company bought asset from Carberson transport Co., Ltd. in order to improve the distribution in its logistic business.

Therefore, the core business of the company is to provide the one stop service of logistics management for finished goods as third party company. The services include warehousing and warehouse management, transportation and distribution to any store in every region.

The company has an area of distribution center about 17,500-meter square at Bang pa-In and 8 regional warehouse. In local area of some region the company use transportation service providers. The company has planed to expand the business by focus of fast moving consumer products.

Moreover, the company has jointed with Booker company from England to establish Booker Insacape Company in order to expand foods trading business and logistic distribution at distribution center in Bang pa-In plant. The company has good facilities with strong distribution network.

Howerer, now, in 1999, the company is took over by the Hong Kong company, Lee And Fung.

Scope of supply

- Trading in consumer marketing
- Finished good warehousing
- Warehouse Management
- Warehousing

3.2.4 Raumthavorn

The company is the local logistic distribution firm. At the beginning, the company provided transportation service and then enhances the service to providing distribution and logistic management by establishes the distribution center. The company has been in the business more than 20 years and has distribution in center region and regional warehouse in many regions such as Surat-Thani, Songkra, Nakornratchasima, Pisanulok, Chiang Mai etc. Also, there are more than 800 vehicles.

Moreover, the company provides services as subcontractor for many companies. The service of the company is reliable, many company rely to use its service. For example, although, Carrefour superstore used the Inscape warehouse, it even used the

distribution service of Raumthavorn because high reliability. Additionally, P&G, Uniliver, Nestles and Colgate used the company's service more than 10 years.

Scope of supply

- Warehousing
- Contract warehousing
- Transportation

3.2.5 TNT (Thailand) Co., Ltd.

TNT (Thailand) Co., Ltd. is a subsidiary company of TNT post group public company limited, Netherlands company. The company provides transportation service, logistic management, postal, and express service. At first, there are two chain companies with different kind of service. The first is TNT express world wide, which provided a postal service. The second is TNT logistic, which provided warehouse management, transportation and distribution services. Now the two companies are consolidated to be TNT (Thailand) Co., Ltd., which provide postal as express mail service and one-stop service of logistics. The company has launched a new service, economic express, which reduce price of transportation service about 40%.

The facilities of the company consist of 120 truck and depots in many region such, Chiang Mai, Hat Yai, Pisnulok, Nakhonratchasima etc., and information technology. The company has invested in information Technology to provide computer online so the customer can check the information of their goods by using the internet. Moreover, the company has established a Customer Service Center of Excellence (CSCE) for its clients.

Additionally, the company train its employees by develop the standard of customer service. And the employees are trained for the best practice of customer service. The customer service center was establised.

At the present, the company provides service for automobile parts, electronic product, and fast moving consumer products. The clients companies consist of Ford, Mazda, IBM, P&G, Uniliver, Philip and Top supermarket.

Scope of supply

- Postal service
- Express Mail
- Warehouse Management
- Warehousing
- Contract Warehousing
- Transportation service

3.2.6Excel logistic Co., Ltd.

Excel logistic has entered Asia market and plan to expand to China and Philippines. They target Thailand as their base. They increased their investment and they just get Johnson and Johnson as their new customer. The headquarter is planing to expand their shipping business into Asia Pacific and plan to become the biggest international distribution company in each area they enter.

The company has set up a warehouse on 42,000 square meters land at Bangbauthong which used to own by Central Capital under the joint investment of Logistic Specialist (Thailand). This warehouse can ships 68 million boxes a year and able to store product up to 35,000 sku. There are about 5,500 to 6,000 types of product

in this warehouse from 140 suppliers and manage 18.25 million boxes a year. Their main customers are Johnson and Johnson, Central Retail, Top Supermarket, Mark & Spencer and Watson.

Scope of supply

- Warehouse
- Warehouse management
- Consolidate warehouse
- Transportation services

3.3 Operation Survey

This operation survey consists of physical distribution process of manufacturers, retailers and logistic & distribution provider in Thailand.

3.3.1 Physical distribution operation of Manufacturing companies

3.3.1.1 Company A

The company produces several types of food product such milk, instant coffee, juice, ice-cream and chocolates. Physical distribution of the company are as figurer 3.1

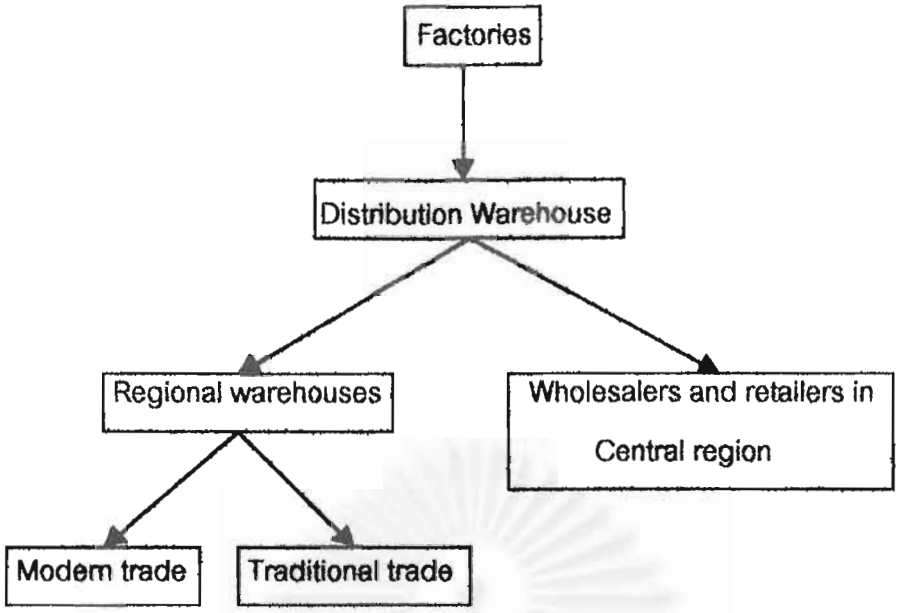


Figure 3.1 Physical distribution operation of company A

According to figure 3.1, finished goods are sent from the factories to warehouse at Srinakarin. Then, the goods will be separated to delivery to two regions. The first region is Bangkok, central area and east of Thailand. There is no regional warehouse in this area. The second region consist of north, northeast and south of Thailand. There are many regional warehouse in Chaigmai, Pisanulok, Nakornratchasima, Suratthani, Konkeng, etc. In the second region, goods will be sent to modern trade, such as Big C, Lotus, and Macro, and traditional retail shops.

However, some fast moving products are delivered to regional warehousing directly from factories, they haven't been delivered to distribution warehouse at Srinakarin.

For Makro, one of modern trade that has many branches, the company deliver their goods from distribution center to each branch directly with passing regional warehouse because Macro requires large amounts of goods that truck can loaded fully at one time.

Warehouse Management

The company used the warehouse management service from service provider who is one famous logistic provider. However, it provided its own warehousing areas.

Methods of stocking goods consist of 2 types as follow:

1. Deep stacking on the floor

   This method is used for product that can be damaged by pile up.

2. Deep stacking in pallet racks

   This method is used for product that may be damaged by pile up, for example, package of paper box.

Transportation

The transportation trips of the company can be divided into three phases as follow:

Phase I is from factories to distribution center.

Phase II is from distribution center at Srinakarin to regional warehouse.

Phase III is from regional to customers stores.

The company uses the transportation service from several transportation companies. Also, several kinds of vehicles are used in different phase.

Information flow

The operation and use of document of physical distribution when goods are ordered are illustrated as figure 3.2

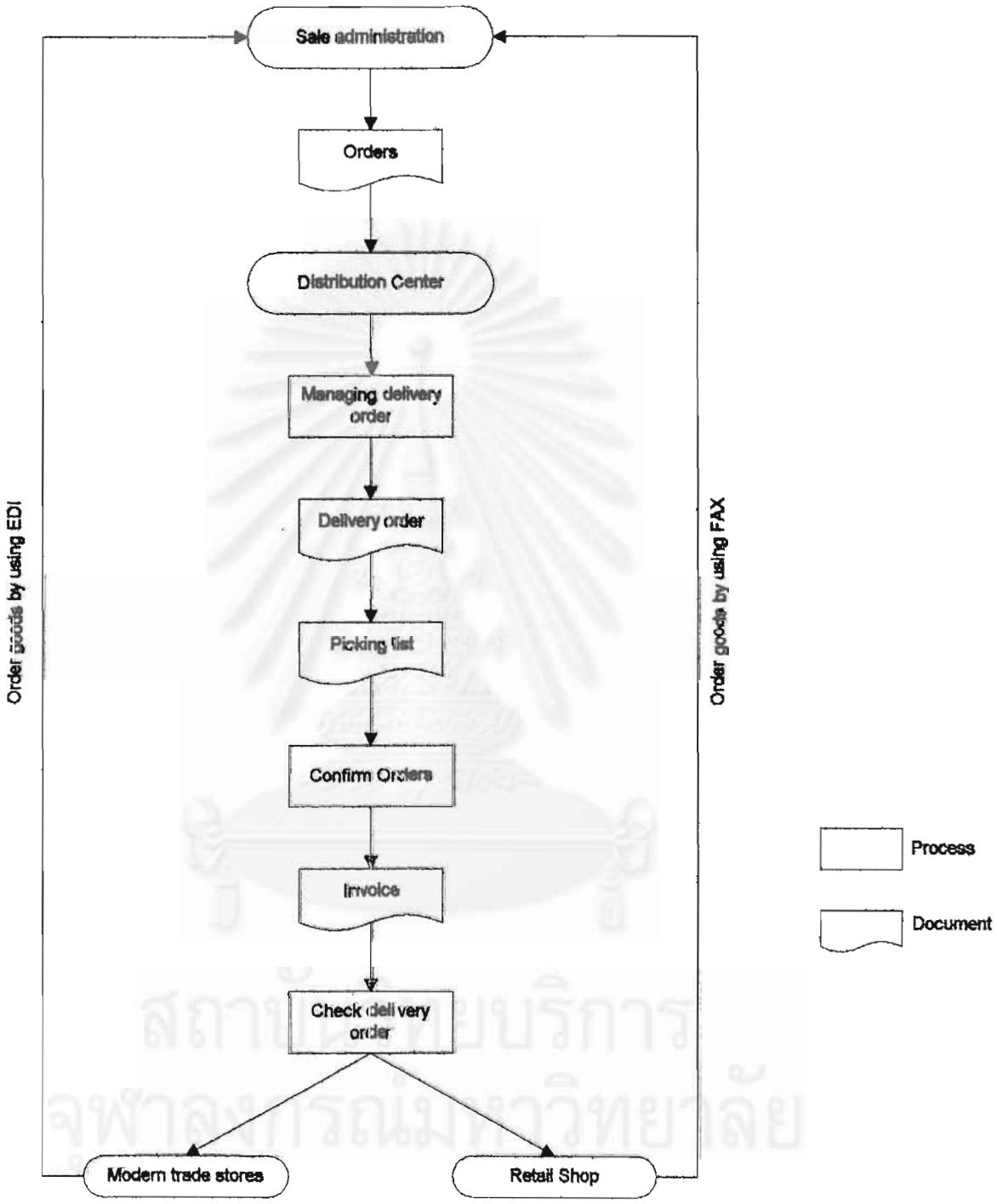


Figure 3.2 Information flow of the company A

The modern trade customers order goods via Electronic Data Interchange (EDI) but retail stores order goods by using FAX. As figure 3.2, the order will be sent to sale administration. Sale administration has authority to forecast demand of good and gather orders from customers to issues total goods orders. Then the orders will be send to distribution center at Srinakarin. The distribution center will manage delivery order and then issue delivery order and picking list. After that , the orders are confirmed and invoices will be issued. The detail of each operation and document are as follow:

- Managing delivery

  This is management of truck loading and paths of transportation to optimize facilities. Trailers will be managed for full load by concerning volume and weight of goods.

- Delivery Order

  This is document that is issued for each truck. It presents types of goods in each truck

- Picking list

  This document present the goods that will be picked from the rack for delivery

- Confirm the order

  This is a process of checking good availability for delivery.

- Invoice

  Invoice is a document that is issued for each customer. Customers have to sign in this document when they receive ordered goods.

- Check delivery order

This process is done by transportation companies who are subcontractor. Delivery order and goods are checked for matching of goods in the list in the orders and goods in truck.

The customers have to sign in invoices when they receive goods to confirm the delivery. Then, the company will pay for transportation services.

3.3.1.2 Company B

This is the group of companies who produce many several types of consumer product such as instant noodles, soaps, toothpaste, cloths etc. The physical distribution process of the group of company is as following figure.

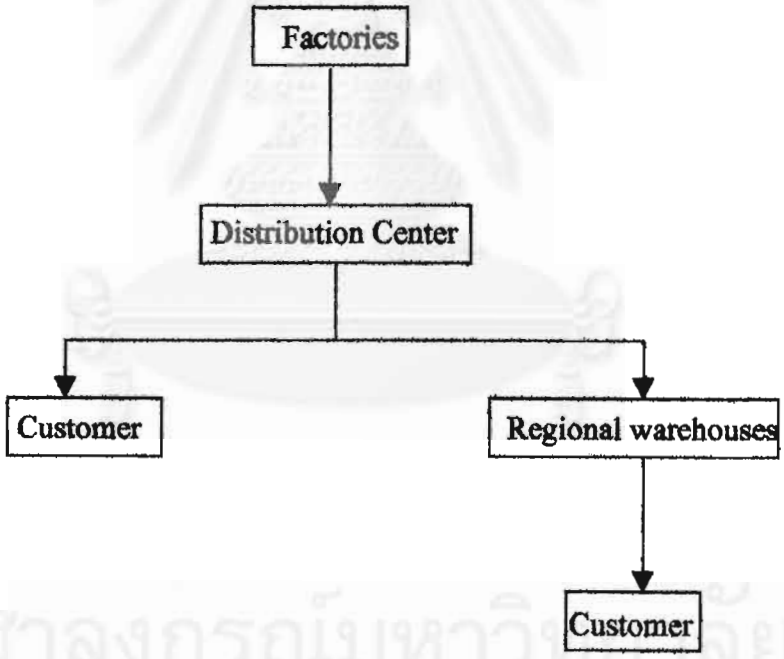


Figure 3.3 Physical distribution operation of company B

The finished goods from factories are transferred to the distribution centers at Rom-Klao. Then the finished goods will be distributed to the customer in central region or regional warehouses.

The company has implemented logistic management since 1996 by using the service of a company that provides warehouse management, distribution management from both factories and distribution centers to warehouse and retail stores. The company also uses transportation service from 30 subcontractors.

Warehouse

The companies has two central warehouses There are 15 regional warehouse in many region of Thailand such as Chiang Rai, Chiang Mai, Phrae, Loei, Udon Thani, Nakhon sawan, Roi Et, Nakhon Ratchasima, Nakhon Si Thammarat, Yala etc.

Transportation

The transportation of the company consists of 3 phases as company A. Use of vehicle depends on each kind of product. Therefore, the company uses 3 types of transportation vehicle for the different types of product as follow:

1. General goods

   The consumer goods, which are longlife products, will be transport in normal temperature trucks.
2. Chilled goods

   Some food like milk and yogurt need to be delivered by vehicles with temperature controlled between 0 C to 10 C in order to maintain its taste and quality.
3. Frozen goods

There are a refrigerator trucks for forzen products which need to control temperature between –18 c to –25 c.

Information flow

Operations and information flow when there are customer orders is illustrated as figure 3.4.

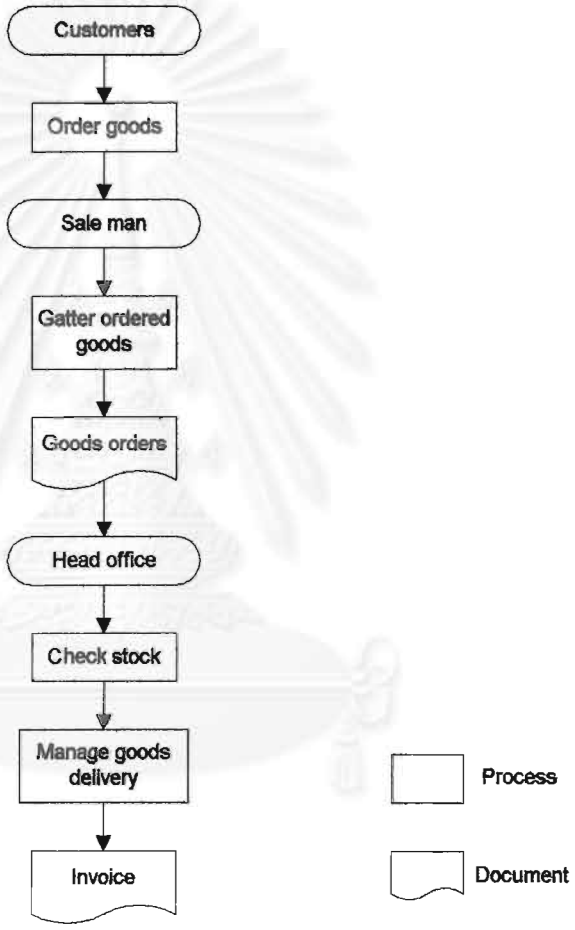


Figure 3.4 Information flow

Each process in Figure 3.4 can be describe as follow:

- Customer orders the goods via pass the sales staff of the company

- Sale man use FAX or EDI to send the customer order to the head office
- Head office receive the order by using the expert system. The system will check the stock. If there are required goods in the stock the system will print invoice. The invoice will show the customer name, the price of the products and the quantities of the product that will be sent.
- The goods will be delivered from distribution center or the regional warehouse to the customer.

Moreover, in the head office, there is logistic information center, which include persons from sale, planning, marketing, manufacturing departments and also the logistic management company. This team will plan forecast the demand of the customer and the quantities of each product that will be produced.

3.3.2 Distribution operation of retailer company

3.3.2.1 Company C

The company is a retailer who has more than 1000 retail shops in every region in Thailand. Most of convenience stores located in gestations. The company contacts more than 200 suppliers for the goods and the customer will send the ordered good the company's distribution center. The company uses a logistic distribution provider as subcontract to provide warehousing and distribution center. After the goods is delivered from suppliers to the distribution, they will be kept in a shelves and will be distributed to the retail shops when required. The operation procedure and order process of the company is illustrate as figure 3.5.

When there are requirement for goods or reordering in each retail shop, the order is send to the purchasing department by using modem or fax. The purchasing department collects the order form every retail shops and then the order to its suppliers. It will take times about 4-5 days to receive the ordered goods the purchasing department responsibility to make a contact with supplier to order goods and prepare the promotion. Also the department cooperate with information technology and marketing department. The purchasing department inform the goods item and type of them to the IT department. This department will define the code of goods. When there are the order, the information will send to the IT in order to inform the distribution warehouse by using code of ordered goods.

After the purchasing department order goods from suppliers, the received goods are dent to the distribution center. The distribution center and transportation are provided by the logistic distribution provider. The order of each retail shop will be sent to the distribution center. After receive the order the distribution center will process the picking lists and invoices before deliver the goods to the retail shops.

However, before the goods are collected in distribution center, the expired date of them has to be check. The company has specification that the goods, which will be in the distribution center, must has recognized expired date label and there must be more than 2 months before the goods going to be expired when there are being on the shelves.

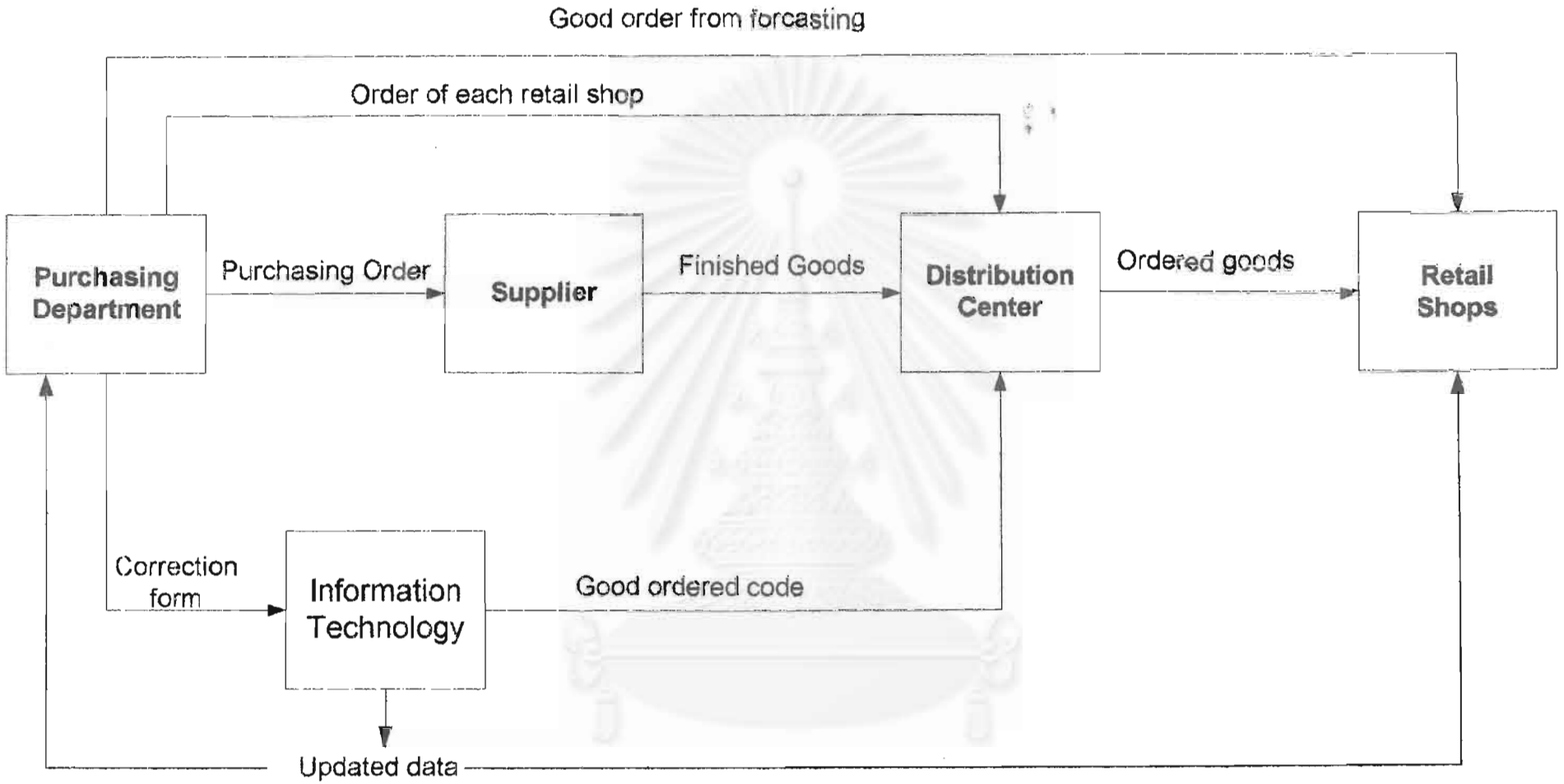


Figure 3.5 Operation of company C

The company uses the transportation of the provider in Bangkok and boundary. In other retail shops that located far away from the Bangkok, the company uses the distribution service of transportation companies. Nevertheless, all of goods are kept in same distribution center so the subcontractor providers the warehouse management for the company. Then, the goods are delivered from the same place at Bangpa-In distribution center.

The charge of services

The charge of the warehouse management that the company has to pay to the logistic distribution provider is about 1.8 % of goods value.

The charge of the transportation service is about 0.8 % of goods values.

For the distribution services of the transportation company, it charge for each trip or used area in the truck.

3.3.3 Logistic operation of existing logistic provider

3.3.3.1 Company D

The company provides warehouse management warehousing and distribution service for Health care, which is the one of subsidiary company in the same chain and retailer group of company C. The company has a distribution center at Ayuttaya and regional warehouse at Chaing mai, Pisanilok, Kornken, Suratani, Songkla, etc.

The operation of the distribution service start from the distribution center where the finished goods are collected. When there are customer requirements for distribution,

the goods will be delivered the retails shop directly if the shops located near the distribution center but if the shops located in others provinces that far from the distribution center, the goods will be delivered to the regional warehouse before retail shops. The operation is illustrated in figure 3.6.

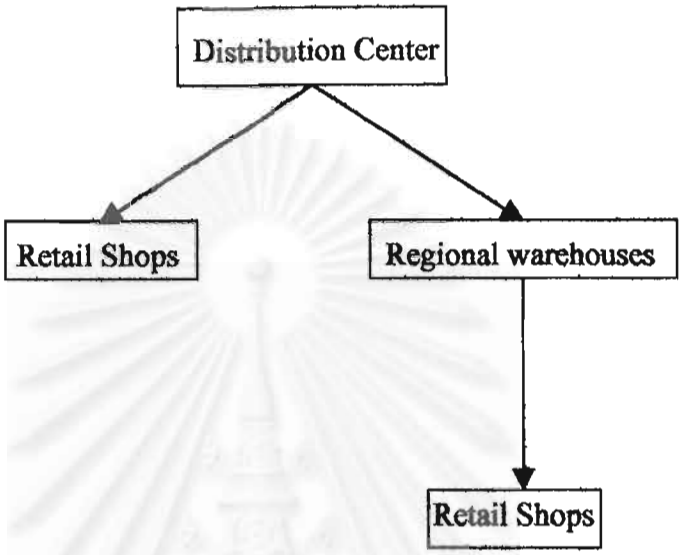


Figure 3.6 Physical distribution operation of company D

The logistic operation of the company about the warehouse, transportation and information flow is as follow:

3.3.3.1.1 Warehouse

The company has distribution center area about 17,000 meter square. In this distribution center, the area is organized for three types of customers. Although the goods of three companies are kept in the same area, the rack for them are provided separately from each others. For example, there are racks A-Z, the good for the company B may be kept in the lack A-E and the others shelves are for the others companies.

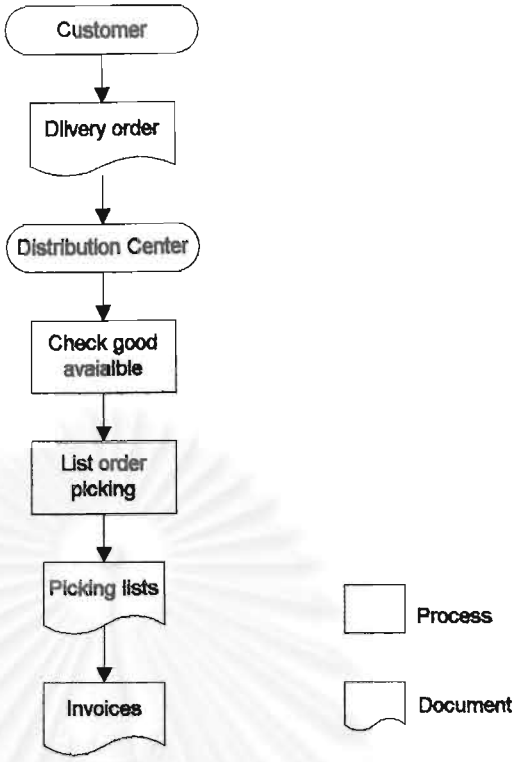
The operation in the warehouse is controlled by computer system. The finish good is distributed by first in first out principal. The previous lot of goods is organized to

be picked easily. The computer will control the picking areas, the worker has to pick the first pallet to delivery because it has preceding expired date.

The amount of goods for each product depends on the selling rate. If the product is fast moving product, it will be kept in the large amount.

3.3.3.1.2 *Information flow*

When the distribution center receives goods from the manufacturers, the goods are kept in the shelves until the customer sends the order to deliver the goods to its retail shops. When the order is received, the order picking order will be listed in order to check collect the ordered goods from the shelves. Then, the company will issue the invoice of the ordered goods. Although the invoice is issued by the company at the distribution center but it is represented on customer behalf. After that, the loading of each trailer will be organized. This process is shown by the flow chart as follow:



Figurer 3.7 Information flow of the company D

3.3.4 Existing operation of foreign countries

In foreign countries, the logistic providers as public distribution warehouse organization have been established for many years. Such companies have always been third-party provider and shipper. The following scope of services is summarized from information that is searched from Internet worldwide webs of several companies.

Scope of service of public warehouse in foreign countries

- Public warehousing
- Transportation
- Inventory management
- Packaging

3.3.4.1 Public warehousing

In foreign countries, public warehouse is based on concept of central storage and distribution of goods in countries and international trade. Such companies have been outsourcing the warehouse requirements to public warehouse.

This service is provided for customer's inventory. The customer's can warehouse their goods for short-term and long-term duration. Also, warehousing areas are provided for flexibility when there are change of demand.

3.3.4.2 Transportation

This kind of organizations provides delivery of loads for many customers. Goods from several manufacturers are consolidated for single delivery. For example, rather than have customer A and B each deliver to a retail store, distribution service will deliver a single combined load of both of them.

For distribution network of foreign countries operation, items are shipped out of warehouse to regions and also across country. For example, some providers locate in United States provide freight forwarding services to Canada or Europe.

3.3.4.3 Inventory management

Many companies provide advice of inventory management and mange inventory planning for their customer as a consultant.

3.3.4.4 Packaging and labeling

Packaging and labeling are value-added activities of physical distribution. These process provide extra value to customer and reduce customer operating cost. Therefore,

packaging become one important process in physical distribution. So packing, repackaging, shrink-wrapping and labeling being implement in several foreign service providers.

3.4 Market Survey

3.4.1 Market Survey

Since the Public distribution warehouse is the new concept of warehouse and distribution in Thailand, the information of demand has not been collected. Therefore, the demands of the Public Distribution Warehouse that will be determined further are from the survey by collecting related information that is published and interview with some customer of case study company.

According to analysis of Thansettakij newspaper about logistic and distribution business in November 1997, market of logistic and distribution business in years 2000 is forecasted to be 3,000-4,000 million baht.

Factors that make rapid growth of this business in this few years is economic recession. Managing director of EAC logistic Thailand expresses opinion to this newspaper that the market demand has been increased because following reasons.

- Problem of decrease in sales figures makes manufacturers need to concern in sale administration and marketing. Then, physical distribution process has been left to third party that is service providers for distribution process.

- Retail shops avoid stocking inventory so manufacturers need more frequent transportation.

- Manufacturers try to minimize the expense of physical distribution.

Moreover, according to the survey from foreign countries, logistic and distribution business also fit to the requirement of expansion of factories. Manufacturers use services of public distribution warehouse organizations and turn their warehouses into new factories when they would like to expand their product line. Therefore for an economic growth in future, this organization can be used to serve expansion of manufacturing.

3.4.1.1 Market demand of manufacturers

According to survey by interviewing customer of case study company who are manufacturers. They express an opinion that the concept is interesting but they are going to use to services only if their confidential information about their product is protected. If manufacturers use the service, their products will be kept in warehouse for 3-4 weeks before the products are lunched to market. Sometime, the marketing strategy of the product is presented in product label such as free gift, price reduction etc. Moreover, some product is newly developed as innovative product. When the products are kept in the warehouse, the public distribution warehouse organization will know the product strategy, which is the confidential information that is important for the competition. For these reasons, the customer who are the manufacturer will used the service only if the PDW can protect the leak of confidential information.

3.4.1.2 Market demand of resellers

Beside manufacturers, resellers are one of customers of public distribution warehouse organization. At present, convenience stores and super stores that need consolidating warehouse to collect several kind of product for their shops. The concept of public distribution warehouse can also act as consolidating warehouse for such

resellers. There are convenience stores in gestation that public distribution warehouse organize can serve their requirement. At present, there are about 1,000 stores in gestations in several areas. According forecasting of an expansion of convenience stores, the stores in next 3-5 years trend to increase to 2,000 in Thailand. Therefore, the public distribution warehouse can serve requirement for these convenience stores and super stores in next few years.

3.4.2 Market Environment

3.4.2.1 Economic

In this year, many economic measure rates represents that the economic are now recovered compare with the economic recession in 1997 and the depression in 1998. According to the table3.1, the gross domestic product (percentage compare with same quarter of previous year) represent the lowest GDP is in Q3 of 1998 and it slightly increases in Q4 of 1998. In this year, the GDP is still increase at 0.8 %in Q1 of 1999 and 3.5 % of Q2 of 1998.

Table 3.1 GDP from 1996 to quarter 2 of 1999

	1996	1997	1998				1999	
			Q1	Q2	Q3	Q4	Q1	Q2
Increase of GDP (%)	5.9	-1.8	-8.2	-12.3	-13.6	-5.8	0.8	3.5

In industrial sector and transportation service, the GDP continuously increase from year 1998 to 1999. The growth if industrial sectors and transportation represent the increase of demand in warehouse and transportation service.

For an investment, the interest continuously reduces from 15.5 in 1998 to 8.3 in this year to stimulate the investment of business.

Furthermore, the economic factor that directly effects the PDW is energy available and cost. Due to the operation process of physical distribution, which includes transportation, the cost of transportation depends on the cost of diesel oil.

In April 1999, the OPEC decides to reduce the production of oil. Therefore, the crude oil price increased dramatically so the retail oils price increased as well. Moreover, the variable of bath value effects the oil price directly. When the exchange rate increase 1 baht per US dollar, the retail price of diesel oil will increase 0.5 baht per litre.

3.4.2.2 Political & Legal Environment

There is no conspicuous law about the warehouse management in Thailand. There is only the law and policy about distribution and transportation. In the existing regulation, the 10 or more wheel truck can not get into the city before 6.00 a.m. to 10.00 a.m. and 3.00 p.m. to 10.00 p.m.

Moreover, there are 4 new regulations that are going to be put in force in 2000 as follow:

1. The 10 or more wheel trailer are not permitted to park in some specification areas in the city.
2. The 10 or more wheel trailer are not permitted to park in public road in internal ring road areas.
3. The 10 or more wheel trailer are not permitted to enter to the public road in internal ring road areas between 5.00 a.m. to 10.00 p.m.

4. In external ring road areas, the 10 or more wheels trailer are not permitted to the road only 10.00 p.m. to 5.00 a.m. but the trailer need to ask for permission.

3.4.2.3 Social Environment

The important social environment that effect to public distribution warehouse organization is the competition of the manufacturer. Because the business provides public warehouse and transportation, the facilities have to be shared between companies. Therefore, according to the competition, worry about their confidential information as mentioned earlier. The information is such as the quantity of selling product in each place, the promotion method etc. Because the public distribution warehouse organization is going to know some information, the confidential protection for the manufacturer is important.

3.4.2.4 Technological Environment:

The technology used for public distribution warehouse includes the technology of handling, information technology and warehouse management system. The material handling is used for product movement. The handling technology also need for product storage when the products are transit shortly in the warehouse and also need to move the product for truck loading.

The information technology is important for order management and order processing process. The information technology is important to the public distribution warehouse to communicate to the customer, when the customers need an information of available inventory or order for service. The current technology that are widely used such as mail phone fax and EDI (Electronic data interchange) etc.

EDI is used as electronic transfer of inventory reporting and invoice. IT exchanges the business documents in standard format between two organizations electronically instead of mail or fax. It makes the communication between the PDW and customer effectively.

In managing warehouse, the computer hardware and software are also required for effective warehouse management. The software is used to identify inventory level and control first in first out distribution to ensure the fresh of product in the warehouse. Moreover, the software can reduce time of managing warehouse and increase ability to manage the inventory level.

3.5 Summary

There are many logistic and distribution providers in Thailand that provide physical distribution services. Their scopes of service are varieties form their initial business. The main service of physical distribution are warehousing and transportation.

According to the operation survey from manufacturer, retailer and service provider, and detail of physical distribution are determined. They will be use for an operational process design of physical distribution warehouse operation for case study company further.

The collected information in this chapter is fundamental information that will be used for analysis in next chapters to achieve conceptual design for case study company.

CHAPTER 4
ANALYSIS OF PHYSICAL DISTRIBUTION OPERATION

4.1 Development of Physical Distribution Operation

As mentioned earlier, the physical distribution is a process of getting goods to customers. The development of physical distribution operation in this chapter is base on analysis of information on the operation survey in a chapter 3. Such analysis covers the past, present and future of physical distribution. Also, the aspect of physical distribution in the form of a Public Distribution Warehouse is determined from the survey in previous chapter.

4.1.1 Operation of Physical Distribution in The Past

Traditionally, a manufacturer produces goods with quantities forecasted from the customer demand. Most manufacturers establish their own warehouse to keep their product until there are orders from customers. The volume of goods to be produced therefore depends on the forecast of customer demand. For this reason, they have built up a stockpile of goods, which are kept before delivered to the wholesaler as illustrated figure 4.1.

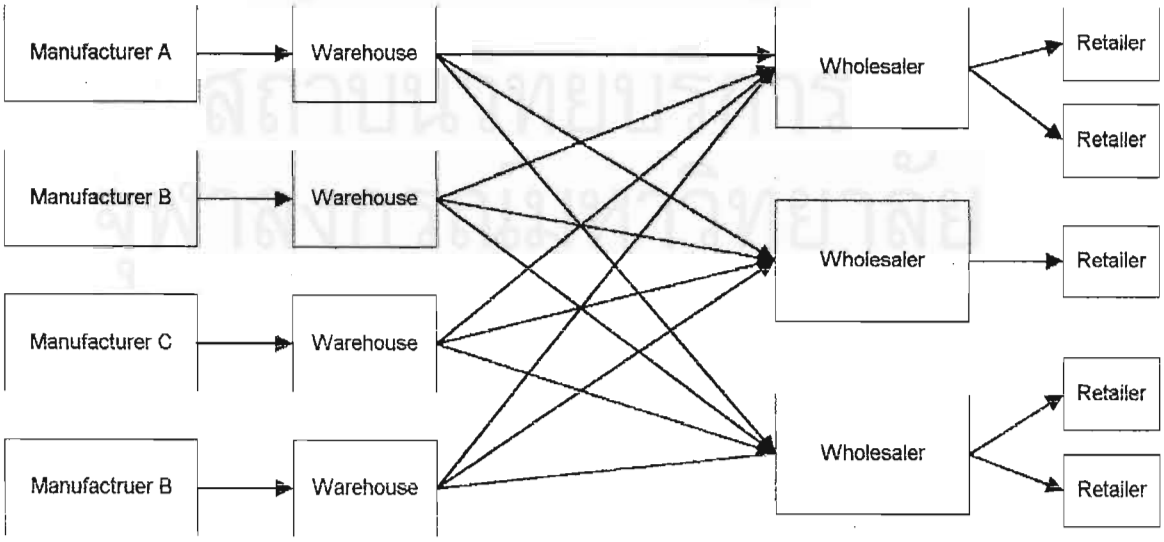


Figure 4.1 Traditional way of Physical Distribution.

Wholesalers purchase large quantities of goods from manufacturers and then sell them in small quantities to retailers. A retailer purchases a wide variety of products and sells to end-users at a retail shop.

Manufacturers and wholesalers use their warehouses to stock finished foods to meet monthly demand. The warehousing areas consist of inventory storage area and forward stock area. The inventory storage area is used to keep the finished goods for supply according to product demand in a period. The stocks are for monthly demand as mentioned. The forward stock area is used to prepare the goods for distribution to customers. The goods in the stock for a few days or weeks before they are shipped to customers.

4.1.2 Present Operation of Physical Distribution

According to the operation survey mentioned in Chapter 3, the physical distribution process, which is shown in figure 4.1, begins with manufacturers and ends retail stores. After their production, the finished goods or products are produced from factories, the goods are always kept in the warehouse.

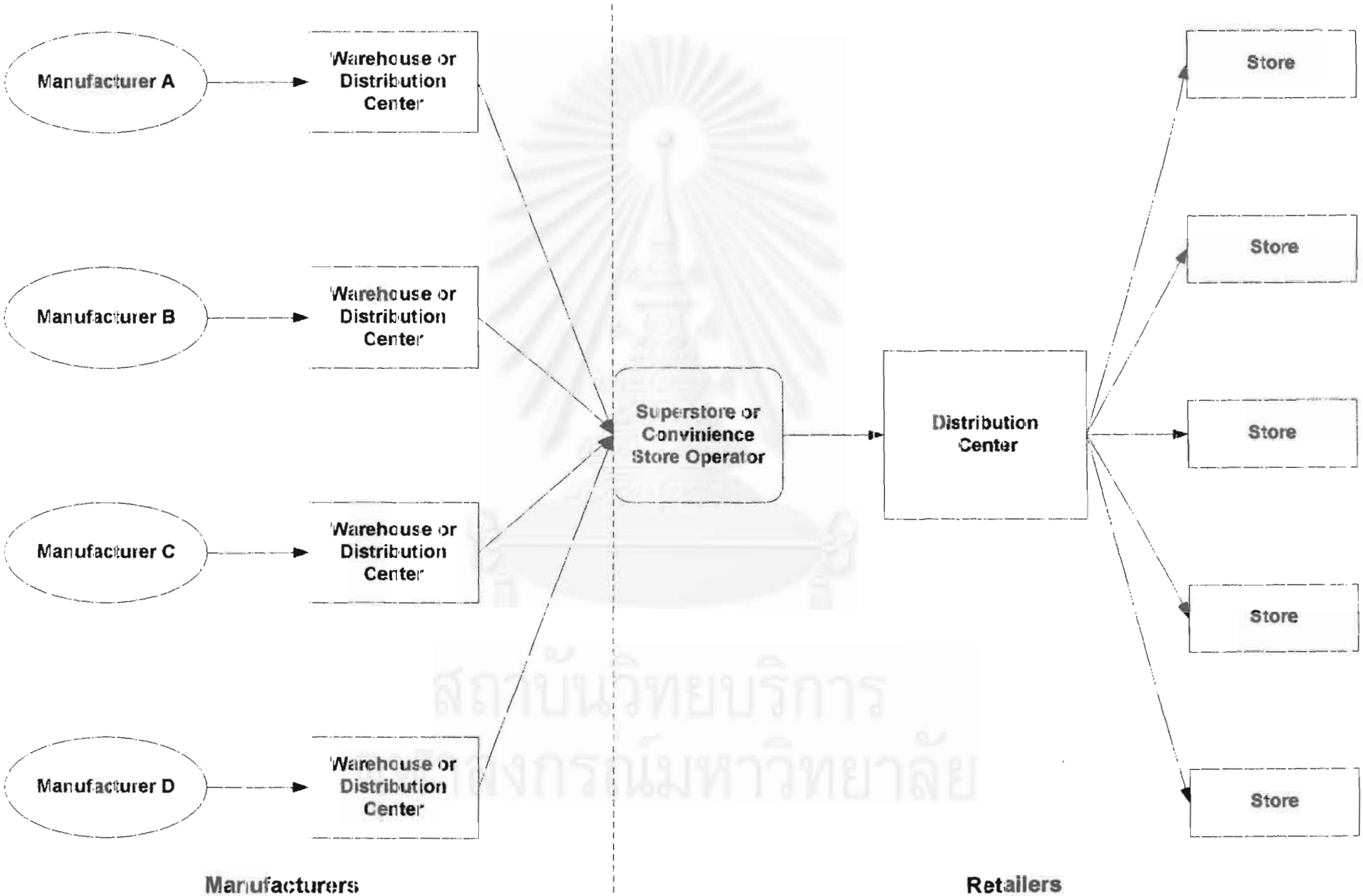
At present, most manufacturers still produce a large quantity of goods based on their forecast. The month storage quantity helps them to respond effectively to demand.

However, process of distributing goods to retailers has now changed with many retail stores having been established in a form of a convenience store or a superstore such as Lotus, Big C, Seven Eleven, Ampm, Tiger Mart, etc. They have many branches located in several areas. These stores normally have an operation office to collect the orders of their retail network, implement and control strategies and contact their suppliers. As each store has a wide variety of goods and are located in different areas, it

needs a distribution center to collect goods from several manufacturers. When a retail store places an order for goods, the store operator will contact the suppliers. The goods will then be delivered from the manufacturers warehouse to the distribution center of the retailer where several brand names of goods are collected before their distribution to the retail stores as shown in figure 4.2.

The above distribution center of the retailer is used as consolidating warehouse to receive goods from multiple manufacturers. Thereafter, the goods will be delivered to specific retail shops on a single consolidated transportation for larger shipment.

The stocking area of the distribution center is a forward stock where the goods are kept for distribution to retail stores within 1-2 weeks. This is different from the warehouse of manufacturers, where most of the goods are kept in the inventory storage area for months.



Figurer 4.2 Existing Physical distribution operation

4.1.3 Desirable Operation of Public Distribution Warehouse

According to the existing physical distribution process, if warehouse of manufacturers and retailers could be located in the same place and their products would be distributed to retail shops at one time, the cost of transportation and warehousing will reduce. In this connection, the Public Distribution Warehouse acts as a middleman in supplying goods from manufacturers to resellers. Public Distribution Warehouse provides warehousing and distribution services to multiple manufacturers and resellers and enables them to use the same facility belonging to this third-party organization. Finished products from several manufacturers are collected in the same place, same distribution center. This place is also a distribution center of the resellers. When the products are required to transport to customers at retail stores, the goods can be checked and transported immediately when there is a contact from the store operators. The goods can be distributed from distribution center directly to its retail network at one time from distribution center of public distribution warehouse organization as may be seen from figure4.3.

Public Distribution Warehouse provides flexibility in term of location, size, number of facilities and a quicker response to seasonal demand. Also, it creates a greater operation because warehousing and distribution services are core business of the organization. With the sharing of facilities, Public Distribution Warehouse has lower variable costs and better productivity compared with private warehousing.

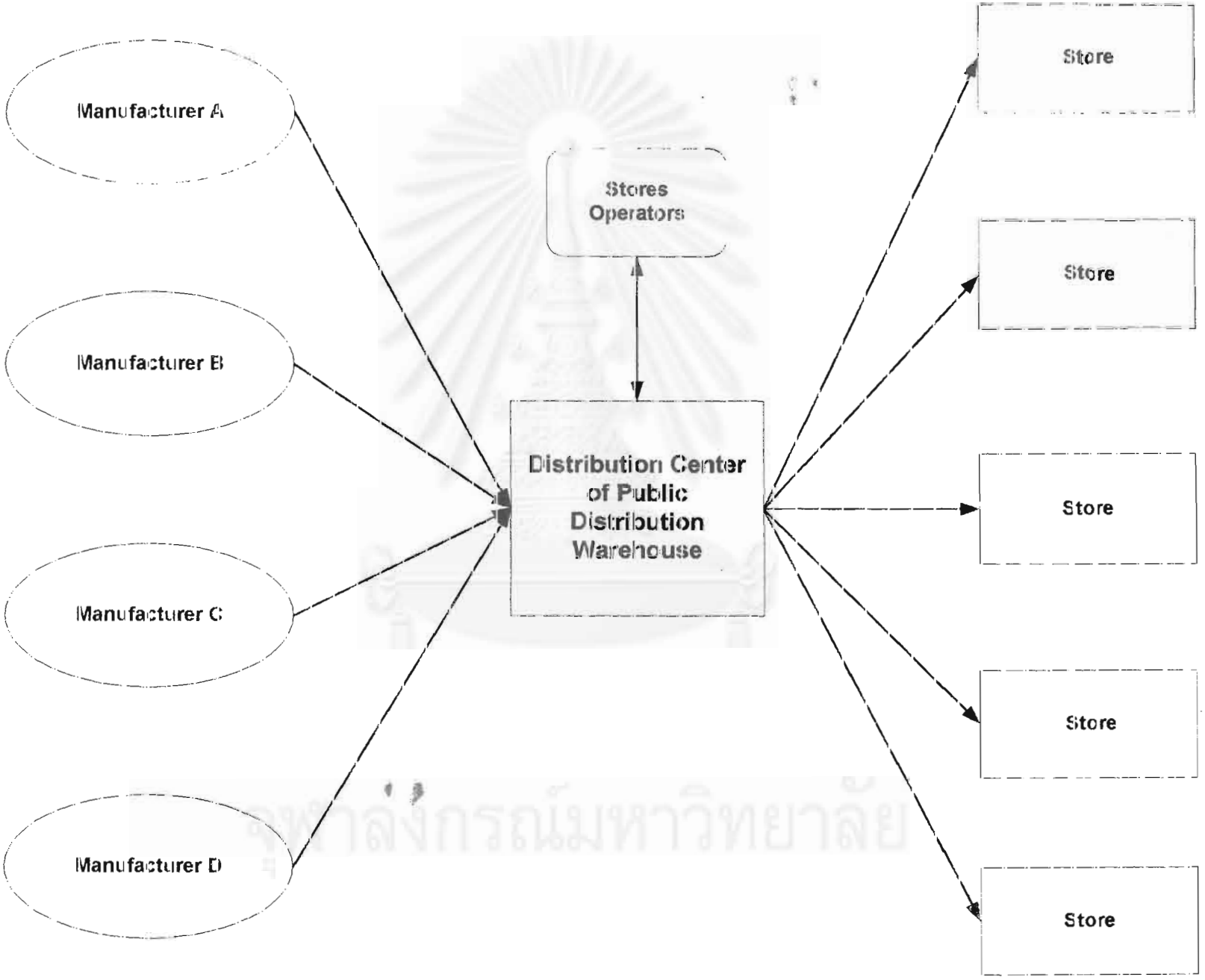


Figure 4.3 Public Distribution Warehouse

The operation of warehousing, transportation and information flow of the public distribution warehouse is determined as follows:

4.1.3.1 Warehousing Management

In public distribution warehouse, a warehouse acts as a finished good warehouse as well as a consolidating warehouse. The products are kept in the warehouse since they were produced completely.

Also, the warehouse of the public distribution warehouse organization acts as the distribution center for both manufacturers and retailers so many kind of product in different brand name are collected in the same places. Therefore, the racks for each manufactures or retailers have to be separated from each other.

At first that the products are distributed from the manufacturers to the customer, the manufacturer undertakes an expense for the warehousing. When the product is required for the retailer, after they are sold, the retailer will undertake an expense of warehousing area of the product.

4.1.3.2 Transportation

The transportation is used to distribute the finished from the factories to the public distribution warehouse and also used to distribute the goods in the warehouse to the retail networks.

The manufacturers have to undertake the transportation from the first phase, factories to the warehouse. The second from the warehouse to the retail shop, the retailer undertakes an expense.

4.1.3.3 Information

The principle of information that the public distribution warehouse organization needs to provide include availability of inventory level, accuracy of information and quick response with timely communication when the information is required.

4.1.4 Future Trend of Physical Distribution

According to the existing operation, the warehouse or distribution center is used for holding an inventory of finished goods. Before a large lot of goods is produced and kept, months-long inventory was planed from a long-term forecast. When their production finished, the product may miss the demand in view of the long time spent in production.

Therefore, the new concept of managing inventory for distribution has been developed as Vendor Managed Inventory (VMI).

VMI is the new process that involves the coordination between a manufacture and reseller within a supply chain. Under the VMI, the reseller sends the data, such as daily sales, shipment, required quality or quantity available, to the manufacturer. The decision of replenishment is made by both manufacturer and reseller for the buyer. Electronic Data Interchange (EDI) can be used to provide common language for relevant data interchange through the process.

Traditional Method Vs New Concept

In a traditional way (Figure 4.4), the purchasing order is issued by the reseller according to the need of the buyer base on the forecast. A large lot is required because

of the lead-time of vendor's supply and the inventory is held because of uncertainty. The manufacturers also prefer good numbers though they would hold the stock. Although, the goods numbers and big billings were shown, they were on 3-4 months. The manufacturer took a long manufacturing cycle time.

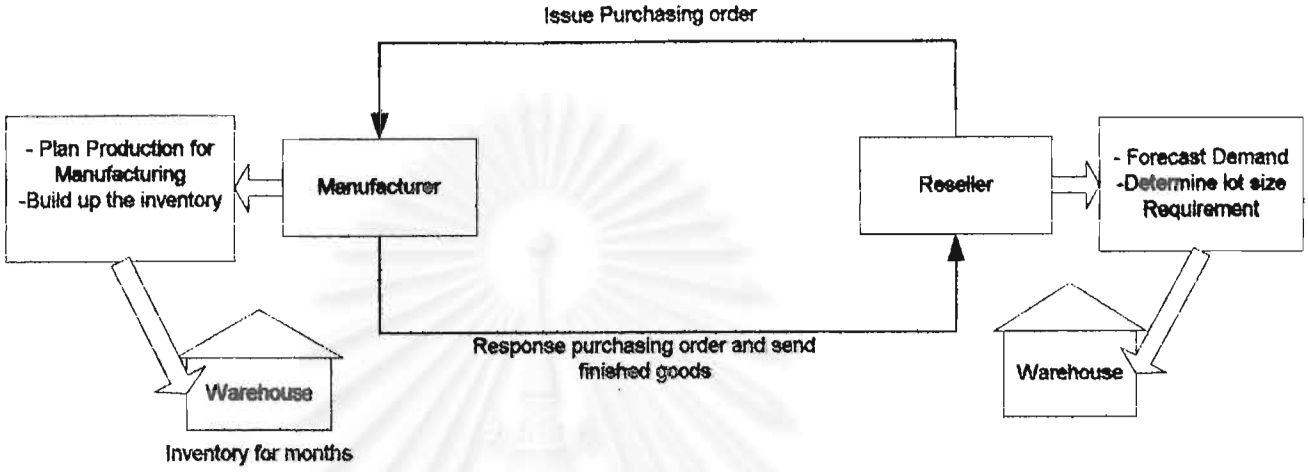


Figure 4.4 Traditional Method

Disadvantages of the traditional way

- A lot of production time is spent
- A lot of production cost is incurred
- A large inventory has to be maintained
- Less precision of production forecast as it is different for long-term forecast to find out what customer really buying

As mentioned earlier about the new concept of VMI, the reseller sends daily stock updates to the manufacturers to enable the vendor or the manufacturer to know what is in the reseller's inventory and what is the daily or weekly demand of the reseller. Replenishment is therefor decided for days or weeks. The vendor will produce goods that are being purchased by users, not just being produced to being stored into the

warehouse. As the days or weeks of inventory are on hand is for days or weeks instead of months, inventory cost will be considerably reduced.

Benefits of VMI are as follows:

- Manufacturers see true demand of end-user
- New product is easy to be managed
- Manufacturers can adjust the order point of safety stock when there is any changes in demand.
- Inventory investment is reduced
- Return on assets and inventory turnover is increased
- Forecasting and planning can be improved

VMI with Distribution center concept

Figure 4.5 illustrates the whole system of physical distribution by using VMI and distribution center concept. To integrate systems, barcode and EDI need to be used. The reseller communicates to vendor for daily updated information by means of EDI. Computer may be used for inventory replenishment system. The electronic link may also be used to communicate the change of net available inventory in the distribution center.

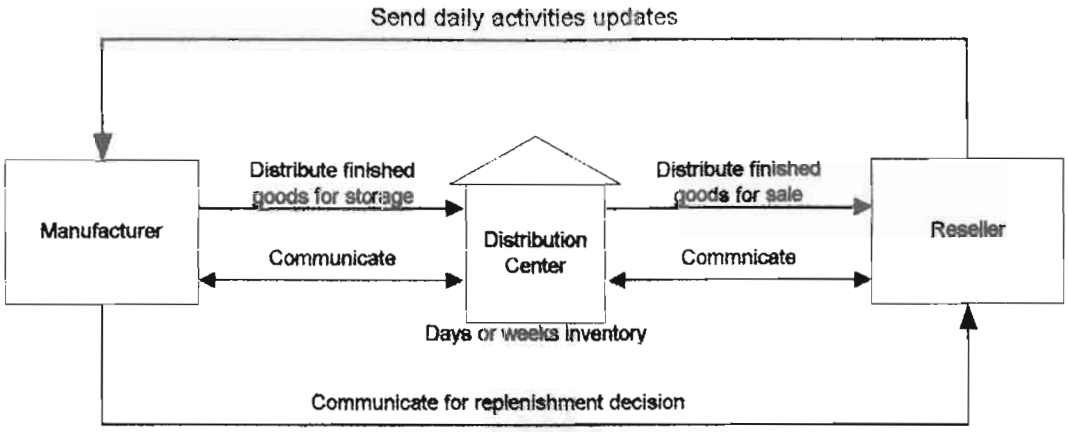


Figure 4.5 New concept of VMI

VMI concept is useful for the physical distribution whether or not the distribution warehouse is a public one. Marketing and sale personal will know what is really being used. The manufacturing schedule is base on true market demand, not sale forecast. This supply-based link of manufacturer, reseller and buyer creates an integration of supply chain.

According to the new concept, the responsibility of warehouse is changed. The inventory is managed for sale in days or weeks. The warehouse is not used to keep the months inventory but will used to manage the distribution of goods. Goods will be kept in the warehouse for a much lesser period of. The warehouse will act as a distribution center for both manufacturer and reseller. The goods are collected for distributing, not for building up a large inventory.

Because of VMI, the replenishment process creates an appropriate inventory so that the inventory storage area is reduced. Most of the areas will them be for a forward stock. The goods are kept to be distributed rather than to be built up as monthly stock waiting for their demand to arise.

The cross-dock warehouse operation (Figure 4.6) is used for warehousing. The warehouse is for multiple users as a public warehouse. A full trailer load is filled with mixed products from multiple manufacturers.

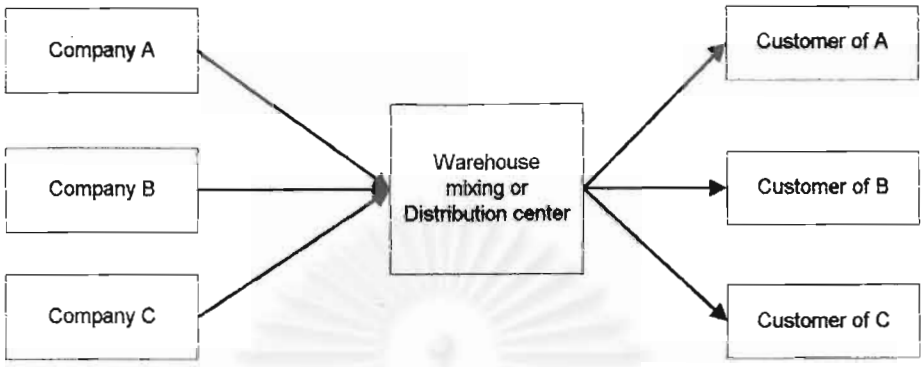


Figure 4.6 Cross-dock warehouse operation

The warehouse operation trends to be cross-docking because of the economic benefits of full trailer movement of multiple manufacturers, reduction of facility cost and more effective use of dock facilities.

4.2 Constraints and measures to remedy the Constraints of Public Distribution Warehouse

According to the operation of public warehouse in chapter 5.1.3, since such warehouse is for several types of goods, there are three constraints that companies express concern, which include reliability of performance, confidence regarding information and suitable treatment of being public provider.

4.2.1 Reliability of Performance

There reliability of both warehousing and transportation services are very important. The public distribution warehouse should have a measures for reliability to prevent damage of goods when they are warehoused and delivered in provided processes.

Therefore, measures to remedy such constraints of reliability. Such measures consist of reliable warehouse performance and transportation reliability.

4.2.1.1 Reliable Warehouse Performance

The public distribution warehouse organization has to take the same care of goods as an owner. After the goods have been produced, the organization has the responsibility to take care of the goods until they are delivered to the stores for sale to end-users. The organization has to fulfil its responsibility and obligation under an agreement it has with its customers.

4.2.1.2 Transportation Reliability

Besides warehousing, the public distribution warehouse organization has responsibility to distribute the goods to customers. Therefore, the organization should provide an assurance to customer by taking responsibility for damage or accident that may happen while the good are being transported. This may be made by means of an insurance coverage.

4.2.2 Confidence regarding information

Since the public distribution warehouse organization provides physical distribution, they will know some information about goods of customers. According to interviewing with manufacturers, there are two confidential information that important for competition. That includes information of product demand and marketing strategy.

Moreover, during a time that goods one warehoused or delivery, the public distribution warehouse organization has to inform status to customers with confiding information.

The measures to remedy confidence regarding customers information are as follow:

4.2.2.1 Confidentiality protection regarding product demand

Product demand on each area is important information, which is necessary for a business operator to remain competitive. Because a public distribution warehouse organization has a responsibility to provide warehousing and distribution services, it is well aware of the demand for products in each area of distribution. Such information has a very important impact on the strategy to capture a market share in each area. Therefore, the public distribution warehouse organization is required to provide the services with honest, and a confidentiality procedure. The information on product demand must not leak to the competitors as well as other parties.

4.2.2.2 Confidentiality Protection for Market Strategy

The public distribution warehouse organization provides finished goods warehousing for product storage right after their production where an inventory of such products will be built up they are launched on the market. Normally, when there is a promotion or a giveaway campaign, the product will display such information on their labels. Since such promotion or campaign is a marketing strategy, it must be kept confidential.

For this reason, the public distribution warehouse organization needs to have measures to safeguard against any leakage of such information to customer.

4.2.2.3 Accuracy and availability of information

After the goods have been delivered to the warehouse for storage, the organization has to provide information to customer regarding availability of the goods, their expiry dates (in case of perishable goods) etc. Also, when the good is distributed or transferred to the retailers, the organization will issue invoices and inform the customers accordingly.

Therefore, information reflects both current status and periodic activity. Both manufacturer and retailer plan and measure their strategy and product base on information of order and inventory. Therefore, information of current status and situation that the third party has to report to the customer is very important. Factual and actual information increase certainty for planning inventory level and requirement.

Information must be readily and consistently available. An information of inventory status, transportation and invoicing are always required by customers. The availability of such information is necessary to response to customers to improve management decision and plan for their strategy.

4.2.3 Suitable Treatment of being public provider

Since the public distribution warehouse is a service provide to several manufacturers, it needs to treat all the manufacturers who make use of it service equally. The facilities should be suitable for several types of products. Moreover, some of customers may be competitors of each other on same market. Treatment of sharing facilities needs to be concerned. Such equal treatment will eliminate suspicion of

manufacturers about competitive advantage when their competitors use service of the same provider. The measures to remedy these constraints are as follow:

4.2.3.1 Compatibility for Variety types of Product

The several types of products need different types of storage since each product can be damaged by different cause. Food products need to be kept in cold condition. To provide the services for several goods, the company should concern about the facilities for each of them. The different types of goods need the different condition, racks, shelves and material handling. For example, the cosmetic products are easy to be damaged by sun.

4.2.3.2 Common Use or Sharing of Transportation Facilities

Since many kinds of goods from several manufacturers may use the same transportation facilities, manufacturers expressed concern that they would not like to see their product brands being mixed with the other brands of their competitors, which is not favorable to the image of their products. In this regard, it is advisable that the vehicles used to transport the products be appropriately covered to avoid such exposure. Also, the cover used will also help protect the products from the weather condition.

4.3 Summary

The physical distribution is an important process in business operation to getting the goods to end-users. This process have been developed for effective and timely distribution. The traditional ways of warehousing and selling have been changed. The super stores and conveniences stores are established instead traditional way of wholesaler and retailer. The warehouse gets more importance, it's not only used to stock inventory, but also act as distribution center to prepare distributing goods to

customer. Consolidating warehouse and regional warehouse is widely used. The physical distribution gets more important and mean for competitive advantage in businesses. Moreover, with advance of technology, the communication becomes important for this process. VMI is a new way to create effective communication for this process.

According to such developments, public distribution warehouse is established to provide the physical distribution services. Because an interesting concept of sharing facilities for economic of scale, the public distribution warehouse is widely established in several country.

However, there are many constraints to implement such concept in Thailand. The organization needs to concern for reliability of performance and confidence of keeping an information. Moreover, the concepts of public that providing services for several companies are important constraints that treatment are needed to satisfy all of customers with different type of product and brand.

CHAPTER 5
DESIGNED OPERATION FOR CASE STUDY COMPANY

5.1 Background of Case Study Company

Case Study Company was established in 1978 to provide transport services for the northern region of Thailand. The shareholders in the initial stage consisted of local transport operation in the northern provinces.

Scope of Service

The company provides the following services

- Transporting goods from Bangkok to various locations in the Northern Region.
- Stock-keeping for delivery to customers in town as well as in rural areas
- Warehousing and stock management for clients.

Vehicles

Various vehicles owned by Sahachoke at present are as follows:

- 100 ten-wheelers, semi-trailers, full trailers, curtain-sided trailers and containers trailer.
- 42 pick-up trucks, 4 wheelers and 6-wheelers located in 6 provinces.

Distribution network

The company has strong distribution network in northern regions of Thailand.

Warehouse

Besides the distribution center in Bangkok, there are warehouses locate in 6 provinces in northern of Thailand. The regional warehouses consist of 3 warehouses in Chiengmai, one each warehouse in Chiengrai, Lampang, Payao, Nakornswan, and Phrae.

At present, the company has improved its communication system. Computer online is available for clients to check about delivery situation.

5.2 The Conceptual Design of Operation for the Case Study Company

Public distribution warehouse provides physical distribution for several companies. Following topics will determine scope of services and operation, which consist of physical distribution operation, information flow and information technology, base on facilities of case study company.

5.2.1 Scope of services

According to operation survey in previous chapter, for providing physical distribution operation as public distribution warehouse, scope of services are cover operation as follow:

5.2.1.1 Public warehousing

Warehouse is provided for several companies as public warehouse. Operation of the warehouse performed as distribution center to provide warehousing for distribution northern areas of Thailand. This warehouse act as finished goods

warehouse for several types of goods and then the goods will be delivered to several retail stores.

5.2.1.2 Consolidating operation

Consolidating is character of merging and acquisitions. The finished goods from several manufacturers can be merged at same place and vehicle to be sent to same destination of retailers. This develops economic of scale of using infrastructures that will reduce inventory space, equipment, operating cost and labor. That results in fewer operations of greater scope and efficiency.

5.2.1.3 Regional warehouse

The second type of warehouse is regional warehouse to kept the goods in shot period of time. The goods are in this warehouse to be split to the individual customer in local areas.

5.2.1.4 Transportation

The company provides transportation services as a carrier to the northern area of Thailand. The service is fore both shipper (manufacturer) and consignee (reseller). Transportation mode used is motor carrier because it provides flexibility as door-to-door operating and speed of movement.

The transportation consists of 3 phases, the first is from manufacturer to distribution center. The second is from distribution center to regional warehouse. The last phase is from regional warehouse to stores.

The operation and vehicles that are used for each phase are as follow:

Phase I

Trailer go to receive finished goods from manufacturer's factories. The finished are kept at container instead warehouse before the trailers are there. After the loading, the trailer will transport the goods to distribution center. Then, the vehicles used is container trailer.

Phase II

This phase is operated when the customer requires for distribution service from the distribution center to their stores. The transportation is from distribution center to regional warehouses in northern area. The goods that are loaded in the truck consist of several types of product for fully load that are for economic of scale. In this phase, the several types of trailer can be used.

Phase III

The last phase of transportation is from regional warehouse to shops in local areas. In this phase, the large lot size of goods will be isolated to retail stores. Then, the picks up truck, 4 wheelers or 6 wheelers are used to deliver goods to retail stores in each local area.

The type of vehicles is provided for several types of goods. Some goods may require low temperature and some of them can be kept in normal temperature. Some foods product need to be delivered directly from the factories to shop because the short period of lifetime.

5.2.1.5 Packaging

Packing, labeling and warehousing, is a value-added process for the finished goods. The process becomes important for physical distribution process. It is necessary

to be provided for customer. Moreover, when goods are packed and then distributed immediately can protect leaking of information that is presented on the label.

5.2.2 Operation for case study company

In the concept of public distribution warehouse, the company takes care the finished product after the products are produced from factories. When the manufacturers uses services of the public distribution warehouse as the subcontract, the finished good warehouse will be not necessary. After the goods are produced, the manufacturer keep them on the containers and then they will be delivered to the distribution center by the container trailer. Therefore, the manufacturer will not waste the wide for the finished goods warehousing.

After the good are distributed to distribution center, they are organized on provided racks. The receiving date is record as well as the expired of the goods. Then, location of the goods will be informed to the manufacturers immediately be computer online. The company has to often inform the stock available to manufacturer.
This receiving process is illustrated if the figure 5.1.

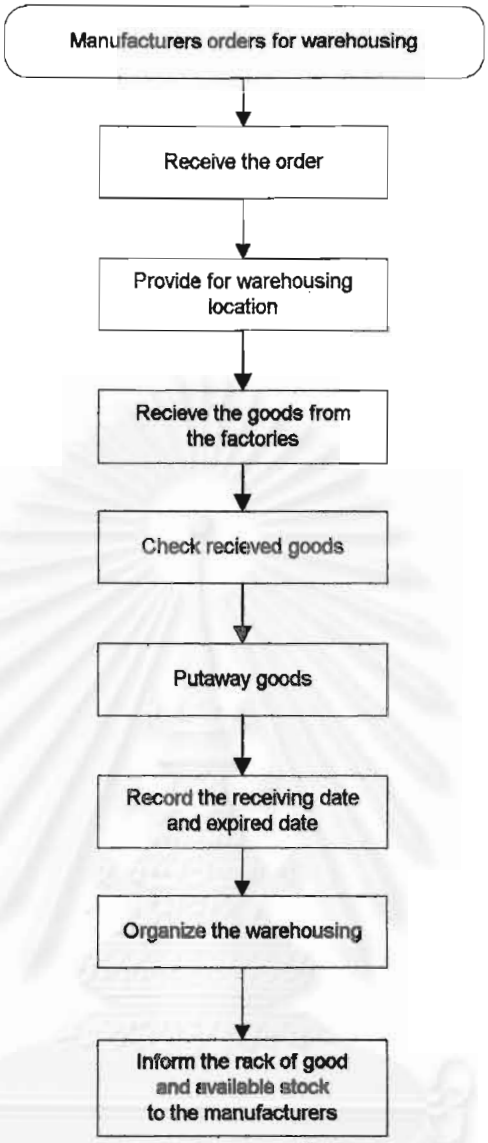


Figure 5.1 Receiving operation

Then, the goods are warehoused until the owner requires them for the distribution. The distributing will perform in the required date that is identified be the owner. If the manufacturer want to delivery the goods to the consignees that are the customer of the company, after the deal between them, the goods will be transfer to the consignee by transferring to the consignee's rack or changing the owner of the existing rack by the computer. Then, the reseller who is the consignee will undertake the expense of warehousing of the goods.

Therefore, goods transfer in distribution center can be physical transfer or logical transfer

- Physical transfer

  The goods are delivered to consignees by truck to specified destination or consignees location

- Logical transfer

  The goods are located in exist location without movement but owner of goods is changed in computer record.

The flexibility of storage areas is provided for flexible quantities of goods. The warehousing of the reseller are operated as the consolidate warehouse. After the goods are transfer from manufacturers to resellers

For the distribution service, the several goods are distributed on the same trucks for economic of scale to the regional warehouses. The operation steps when the customer require for the distribution service illustrates as figure 5.2.

The regional warehouse act as break bulk warehouse operation for each product that spilt the goods to individual customer and arranges for local delivery. The bread bulk operation is used to lower the cost of transportation in several local area and reduce difficulty in tracking.

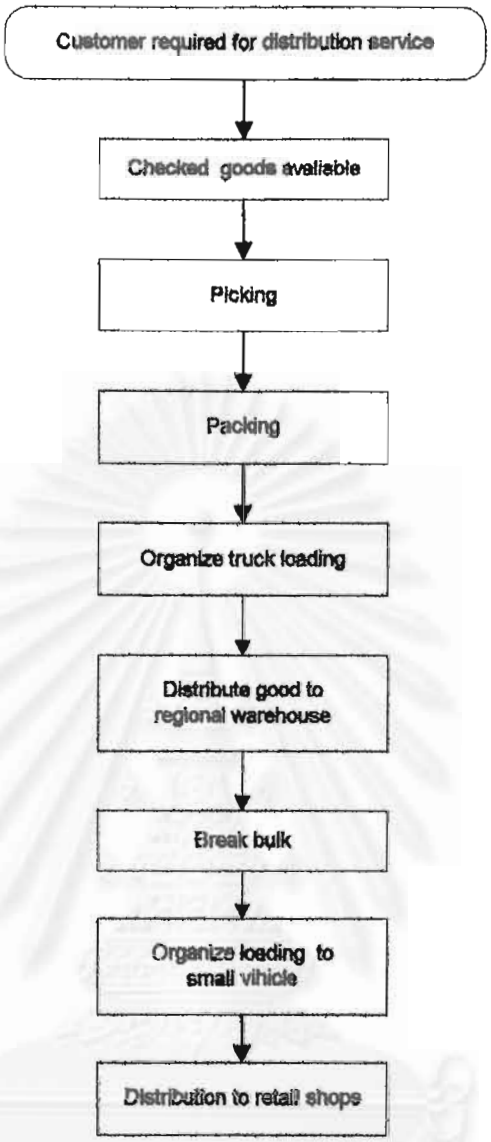


Figure 5.2 Distribution service

Figure 5.3 illustrates the operation of the company. Suppose the company A, B, C and D are our customers who are manufacturers. The company E and F are our customers who are reseller. When the manufacturer produce their products completely, The products are provided in the containers then they are delivered to the distribution center. The goods are warehoused at the same place but in the separate racks. . When the customers, manufacturer or reseller, they will be distributed to the regional warehouse and retail shops respectively.

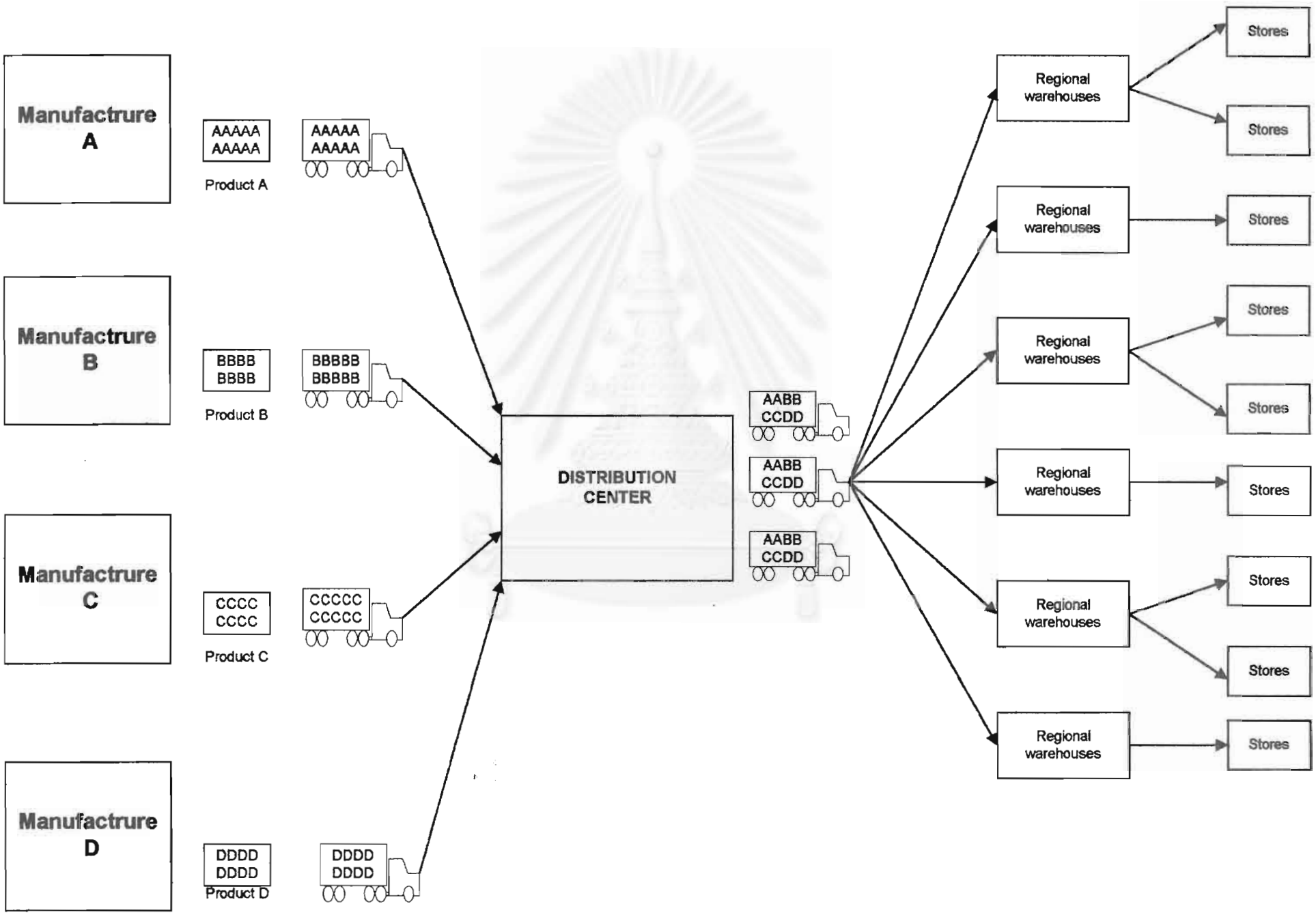


Figure 5.3 Designed operation of the company

5.2.3 Operational process design

Operation of the company starts with receiving goods from several manufacturers when customers request for service. The customer needs to inform their request. When the goods are received information of goods will be recorded.

After the product is delivery to the company, the product will be kept in the racks of each manufacturer. At first, the product availability is checked to inform the retail operator. After that, an invoice is issued on behalf of the manufacturer. Then, the retailers undertake the expense of warehousing area of the products.

When there are orders for distribution goods to the retail stores, the goods will be delivered from distribution center to stores that are specified. The ordered goods are checked and organized for each retail store. Then, the invoice is issued on behalf of the retail operator. After that, the loading is organized and goods will be distributed to each retail store.

The operational process is illustrated as IDEF0 in Figure 5.4.

Input consist of

- Customer request for receiving
- Finished goods
- Goods description
- Customer request for warehousing
- Delivery order
- Payment

Control consist of

- Goods database

  This is the record of information in goods description of every goods

- Inventory database

  The inventory level of each goods and goods availability are recorded.

- Regional warehouse address

  These addresses are for transportation.

- Stores addresses

  The addresses of each retail store is used to control truck loading for each destination.

Mechanisms consist of

- EDI is used for communication.
- Barcode system is used for database system.
- Warehouse management system is used for managing location of goods.
- Material handling is used for move goods
- Vehicles are used for transportation.

Output consist of

- Goods receipt
- Goods inventory
- Goods delivery
- Bill
- Invoice

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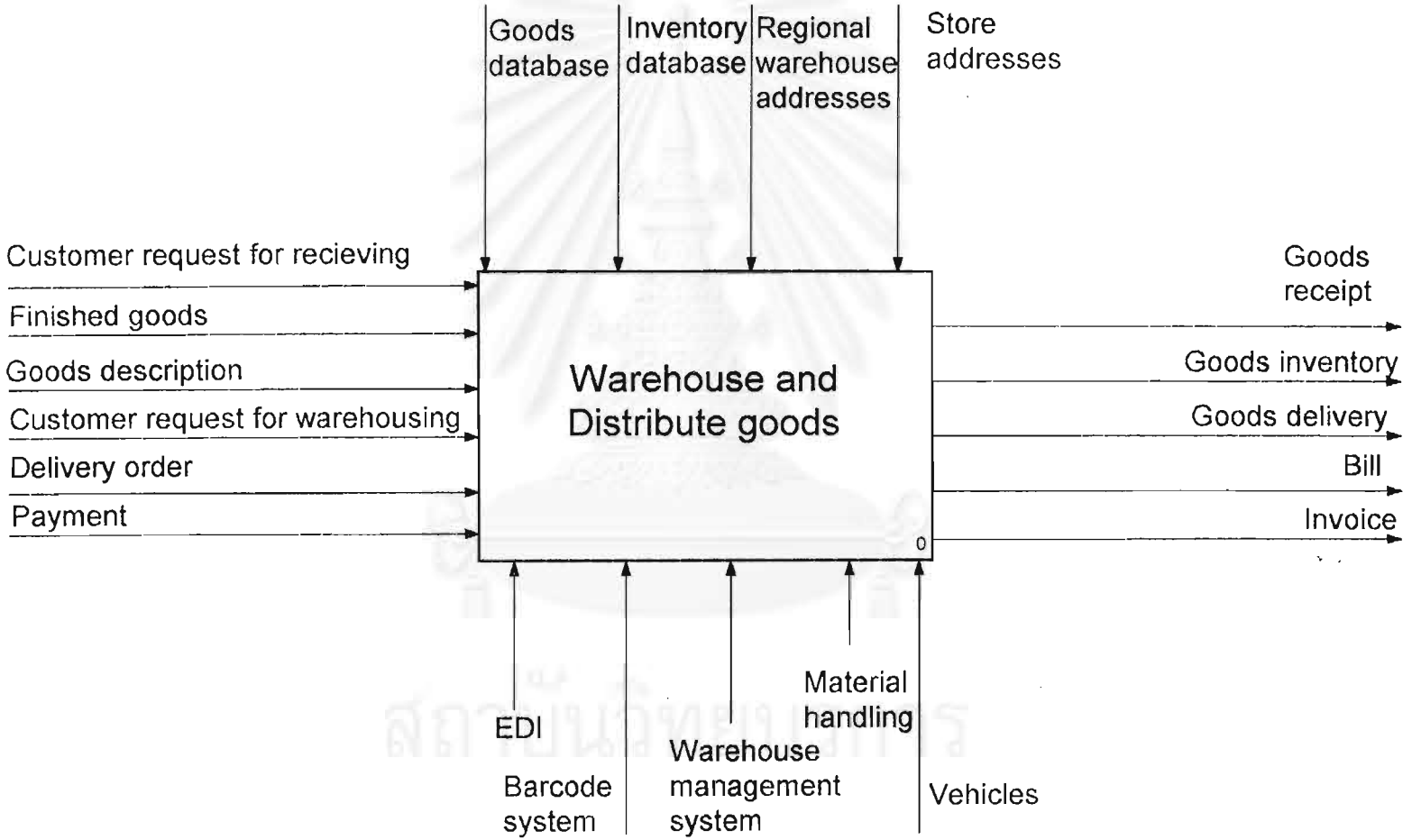

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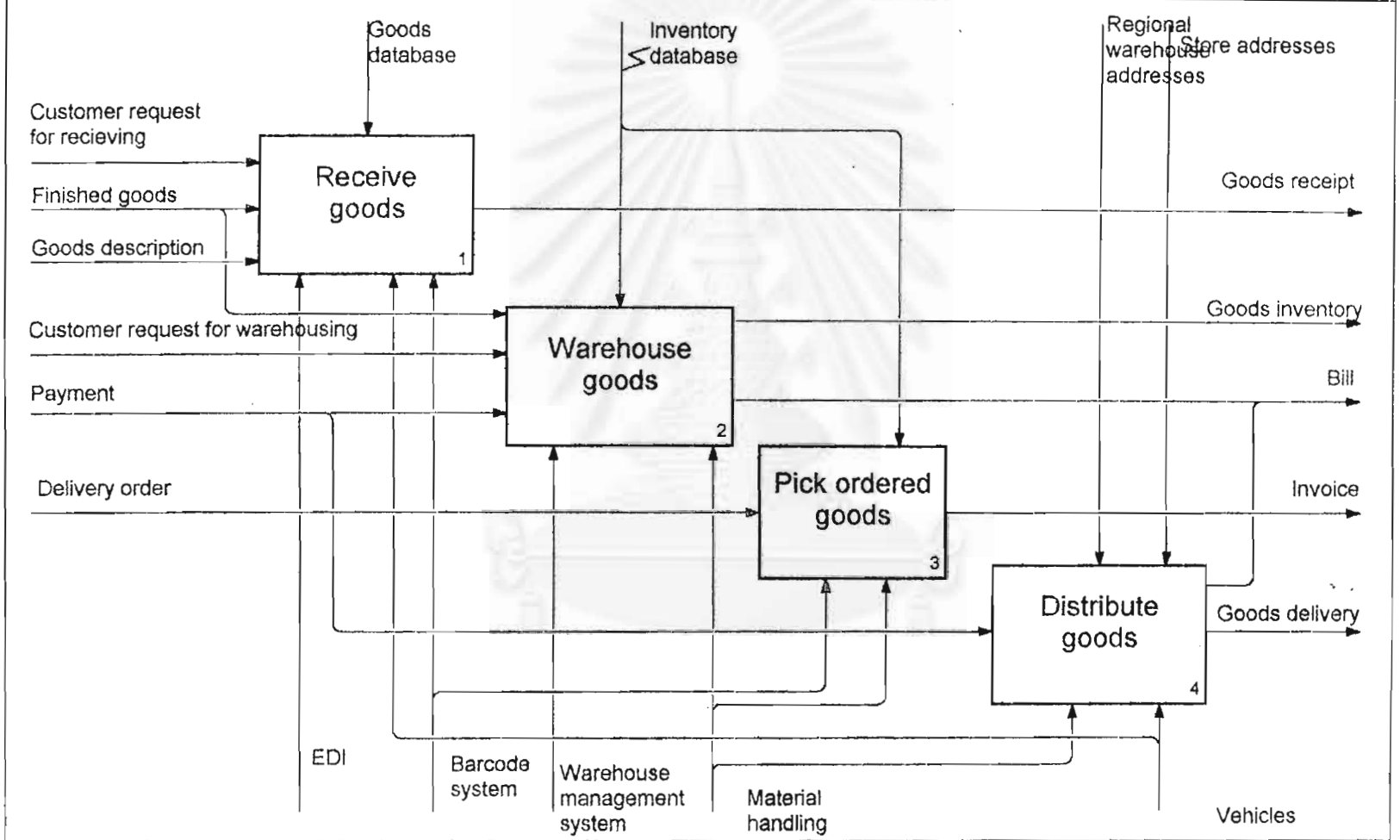

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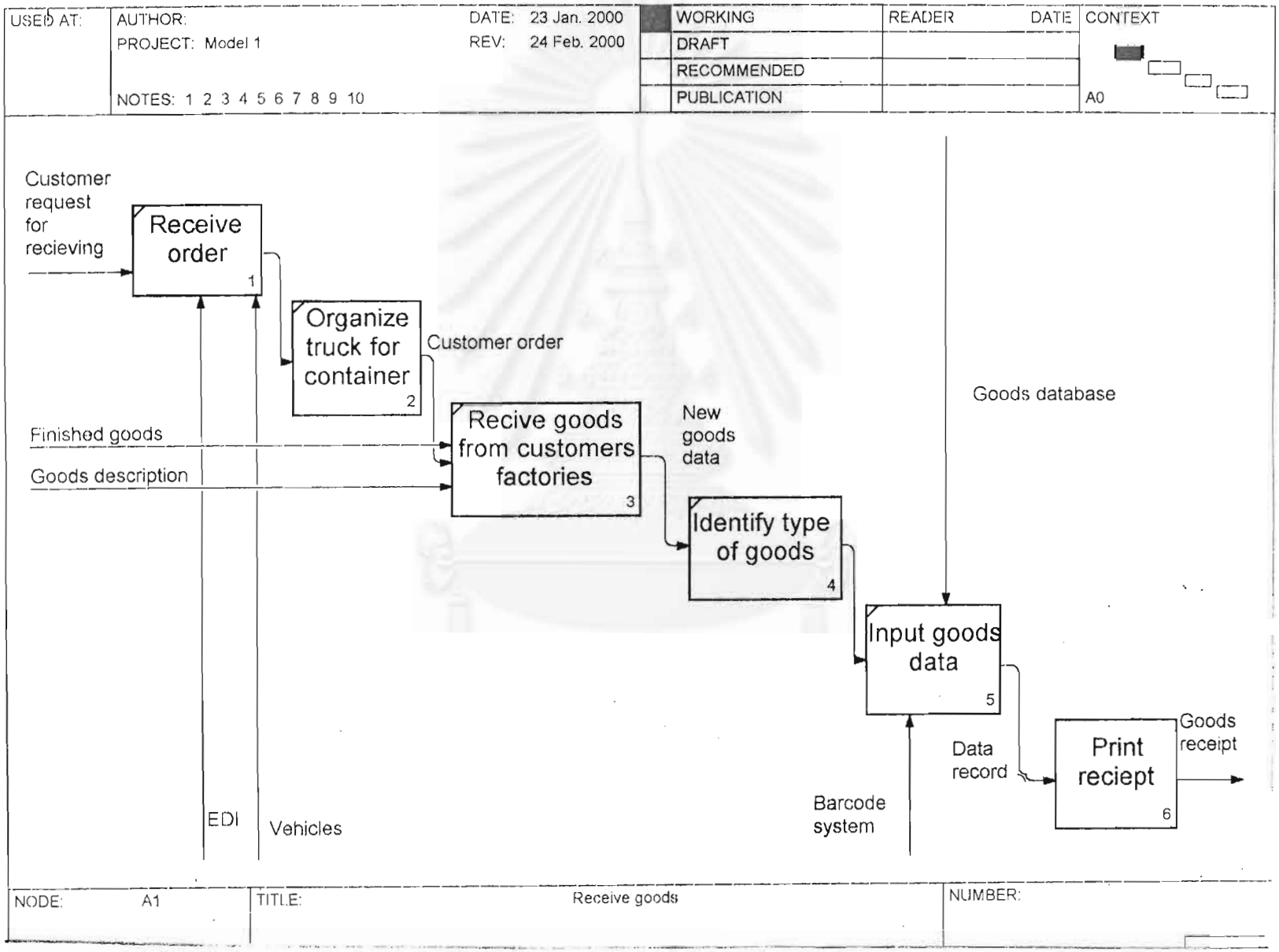
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Receive order
1
Organize truck for container
2
Customer order
Recive goods from customers factories
3
Finished goods
Goods description
New goods data
Identify type of goods
4
Goods database
Input goods data
5
Print reciept
6
Goods receipt
Data record
Barcode system
EDI
Vehicles
NODE: A1
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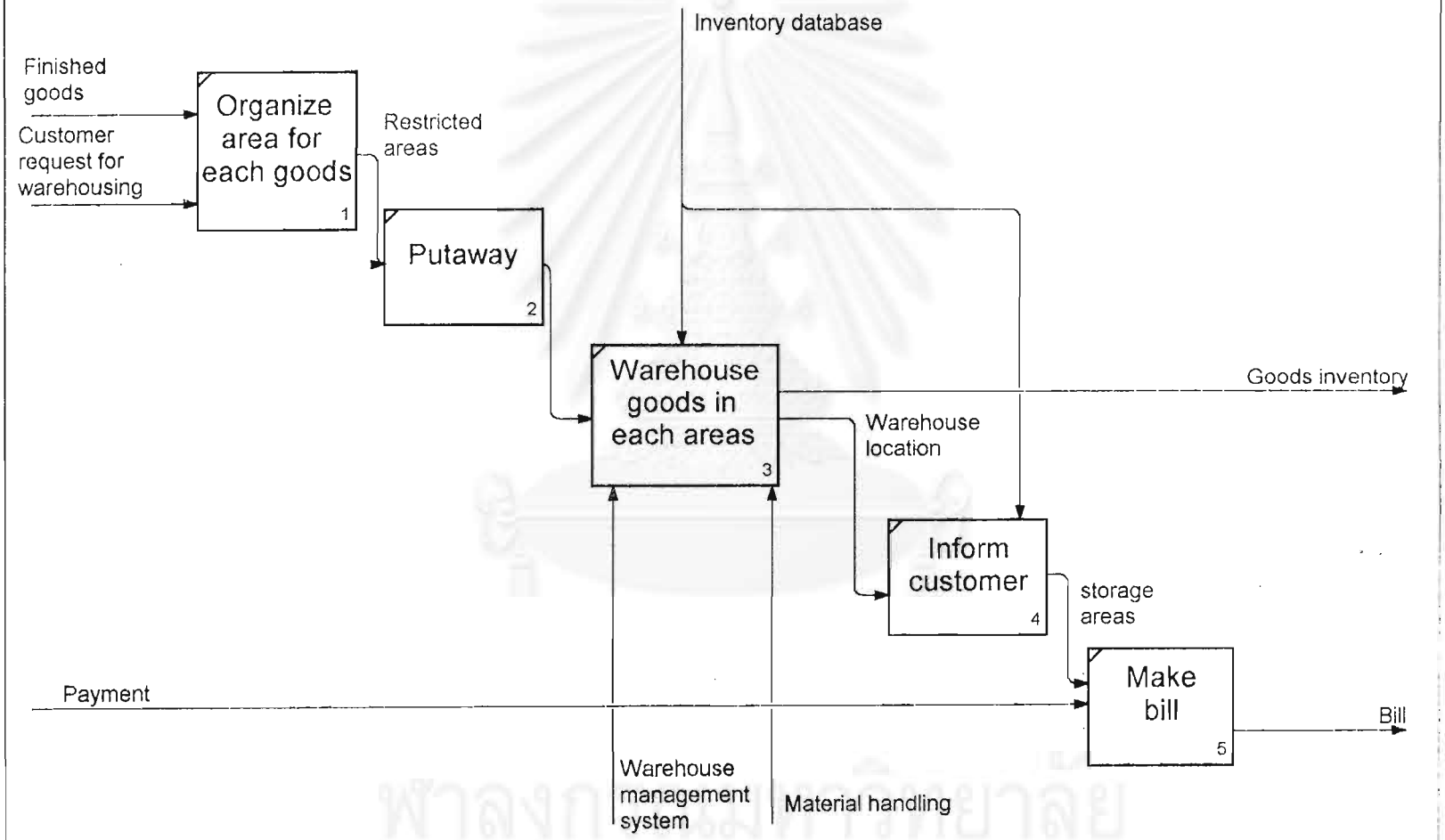

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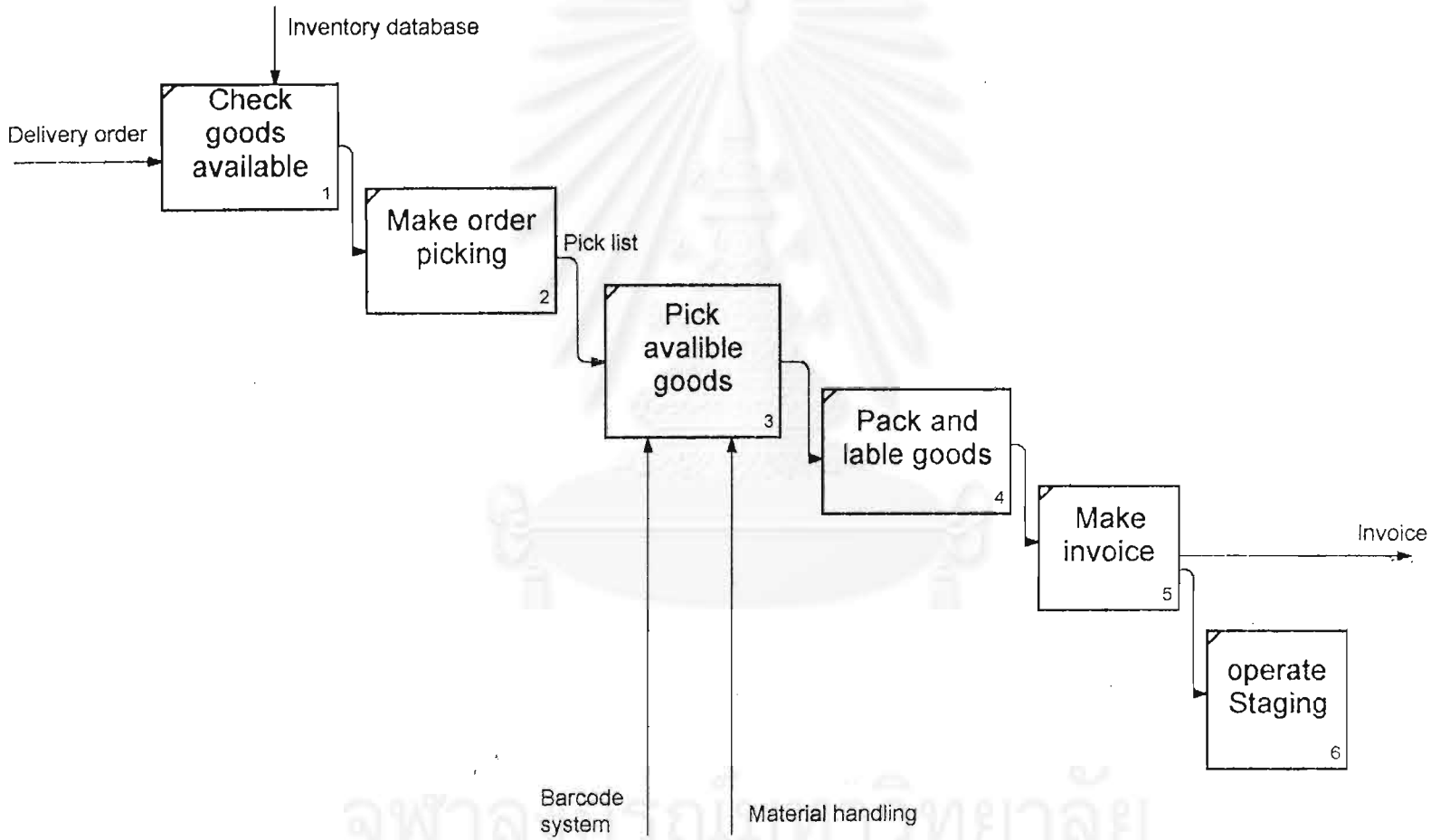
			RECOMMENDED		
	NOTES: 1 2 3 4 5 6 7 8 9 10		PUBLICATION		A0



NODE: A3	TITLE: Pick ordered goods	NUMBER:

USED AT:	AUTHOR:	DATE: 24 Jan. 2000		WORKING	READER	DATE	CONTEXT:
	PROJECT: Model 1	REV: 22 Feb. 2000		DRAFT			
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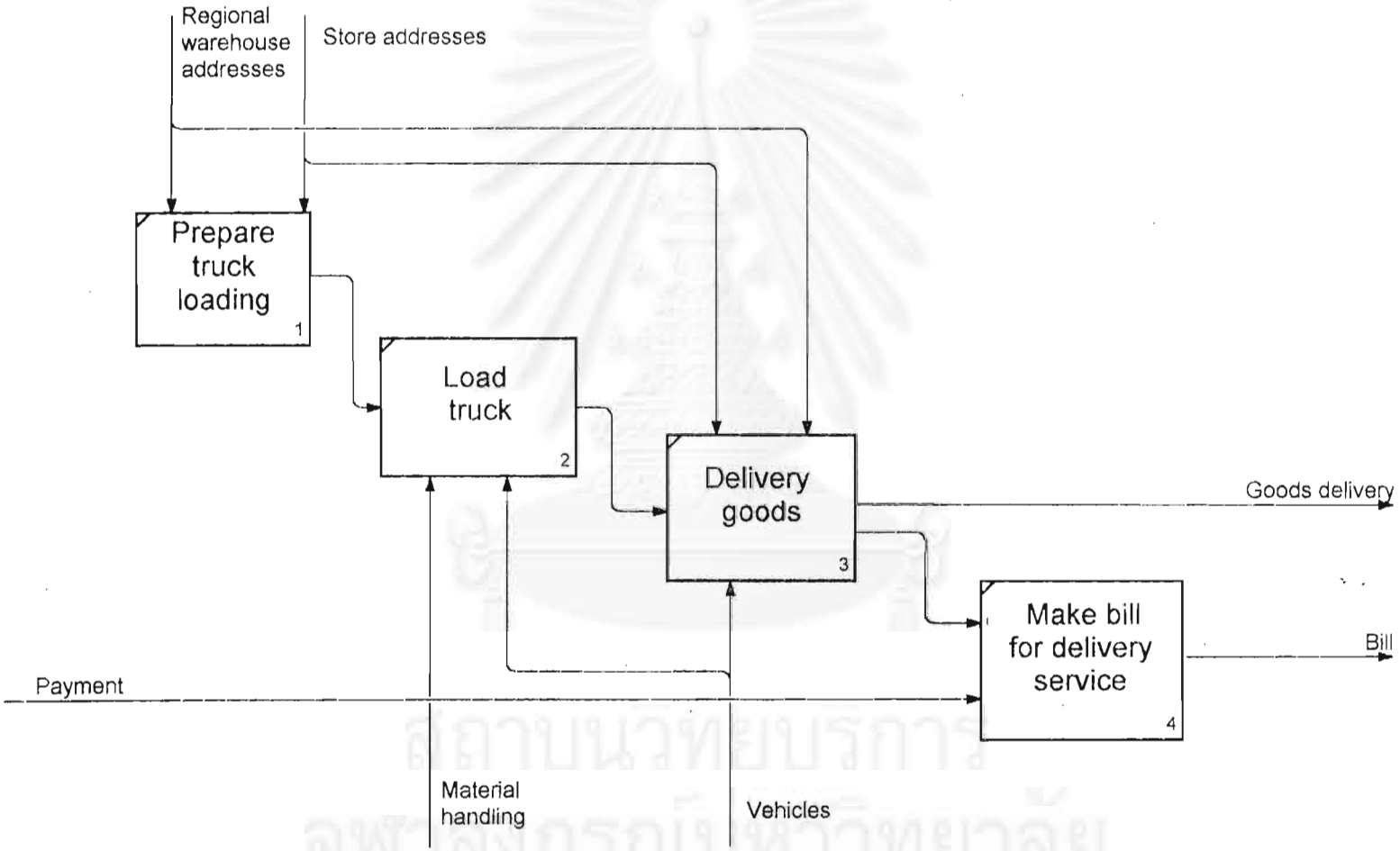

NODE: A4	TITLE: Distribute goods	NUMBER:

The communication technology that should be used is EDI. It is used to communicate information between organizations by computer to computer electronically as figure 5.4. That result in an effective communication, an increase of accuracy and timely report.

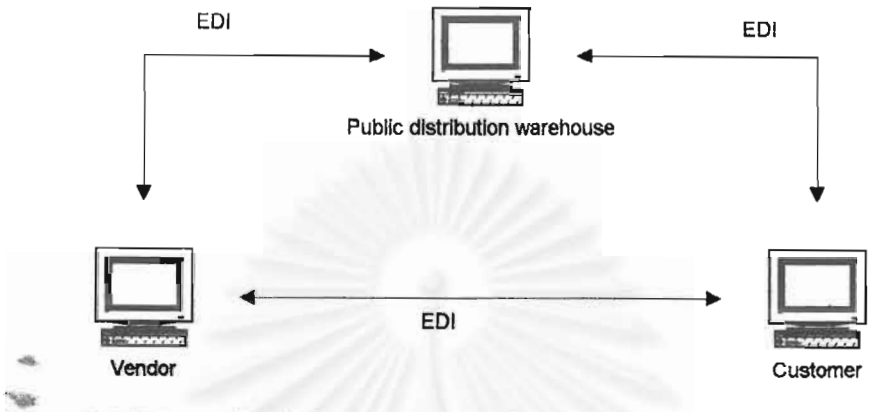

Figure 5.5 Using of EDI for communication

With EDI, the public distribution warehouse, manufacturers and resellers can be linked. EDI is very useful to transfer the inventory report of goods available and invoice for the public distribution warehouse.

EDI combine with barcode and scanner will create faster and accurate exchange of information when product are shipped.

5.3 Principles of performance for public distribution warehouse organization

According to such concept, there are the aspect and regulation of that need to be concerned to prevent the problems of constraints and convince the customer for the service. Operation that need to be concerned about constraints are warehousing and transportation which are main operation process of physical distribution. There

5.2.4 Information technology

Software

Warehouse management software is used for managing warehouse performance and check inventory status. The software is used to manage location for each goods by concern on type of them, priority of receiving and distributing, quantity and weight of product to warehouse them in appropriate location.

Hardware

Beside use of computers for warehouse and transportation management, barcode and scanner are important hardware needed for effective operation of the publicat1ion operation.

Barcode and electronic scanner facilitate logistic information collection. When goods are moved, the information of receiving and shipping will be collected and recorded by barcode scanner. Also, when goods are sold, scanner will be used to record information of sale. The manufacturer or retail shop can determine the demand of customers and make the decision of replenishment. Barcode also distinguishes types of product, size and flavor.

Moreover, with the use of barcode, the information will be recorded in computer rather than paper as traditional method. Therefore, the paper document will be reduced. The lost and damage of document will be eliminated.

Telecommunication

fore, the principles that going to be determine consist of principles of warehousing and transportation performance.

5.3.1 Principles of warehousing performance

According to constraints that are determined in previous chapter, warehousing performance principles to create measure to remedy such constraints are as follow:

5.3.1.1 Flexibility of warehousing area

Because the variety of demand in a year, the warehousing area need to be flexible according to the demand. The warehouse area should be able to extend in high season demand. Each product has high seasoning season in a year. The company should provide the flexibility for the customers when they need more storage area. The customer can change the location, size of the storage when they require. Then, the manufacturer and resellers can respond any of seasonal demand for theirs customers.

5.3.1.2 Variety types of loading area rack and shelve

The company has to provide service for variety type of product. The variety types of products need different type of rack. For example, the product that nay be damaged when they piled up so the stacking pallet racks is needed to prevent the damage. If the products are not damaged by piling up, they can be warehoused by deep stacking on the floor storage.

5.3.1.3 Notification of storage periods

The period of storage should be specified. If the goods are not removed before the specified date in the notification, the company should notify to the customer before

the goods is deteriorated or declined in value. A period of storage for each goods depends on life of the goods. The receiving date of each product should record when they are distributed to the distribution center.

With this notification, the customers are confident that the company will remind before the goods are deteriorated or declined in value. Because the company will take care the goods and inform the customers, they can plan to sell their product before the expired date.

5.3.1.4 Notification of responsible person for each goods

Since the company provides the service for several type of product, it need to protect the confidential information for its clients. According to 4.2.1 and 4.2.2, keeping the information of each goods as confidential can perform such constraint. For this reason, the responsible persons of each goods need to be notified. The persons need to be trained for conventions. When there are problems, it will be easy to investigate. Moreover, it will create the liable for damage and loss in warehousing.

5.3.1.5 Restriction of storage area

The restriction is needed for liability and security of warehousing. The person who are not concern or has responsibility for goods can not enter to the storage area of such goods.

5.3.1.6 Isolation of different type of product for suitable condition

Because the warehouse consists of several types of goods, the separated area should be provided to prevent damage of the good. Moreover, different type of product

needs different condition to remain quality during warehousing. Therefore, the appropriate condition for each product is provided.

5.3.1.7 Final packing, labeling and bar-coding

Because the products are warehoused since they are produced, they may be in the distribution center for long period of time, a couple of week or a month. Most of the manufacturers concern about the promotion strategy that labels on the product for example, buy one get another one, may leak before the product are lunched. That is very important for the competitor. If competitors know such a strategy, they may lunch a better one.

For this reason, the final packing, labeling and bar-coding services can eliminate such a problem. The product can be delivered to the distribution center without label or finial packing. The company will provide this process before the goods are launch to the market for a week.

Moreover, some kinds of product are produce from the same factory though they are sold in different brand name. Therefore, the company may cooperate with trading company for the labeling of brand name and then provide the final packing for the goods.

5.3.2 Principles of transportation performance

According to constraints of transportation, aspects for transportation reliability of the company are as follow:

5.3.2.1 Provide suitable types of vehicles for products

Since transportation service is for several types of product, several types of vehicles need to be provided for suitability. Different products needed to be kept in different condition or temperature. The condition in the truck will be control to remain quality in some products. Some product need to avoid high temperature, some product need to avoid humidity.

5.3.2.2 Provide covered vehicle or container truck

According to opinion of manufacturer, that they would not like to see their products being mixed with their competitor during transportation, covered vehicles or container truck are used for this requirement.

Moreover, such kind of vehicle can protect damages of goods from surroundings or weather condition.

5.3.2.3 Take responsibility for damage and loss in transportation

Although, reliability in transportation process is provided and also damages and losses are prevented, they may be occurred by any accident. If there are damage or loss that happen during transportation process, the company will take a responsible for such loss.

5.4 Implementing procedures for case study company

According to current facility and current operation of case study company, implementing procedure for improvement to be public distribution warehouse are as follows:

1. Organize an existing distribution center for public warehousing. The warehouse has to be prepared for finished good warehousing, consolidating and distribution with concern in principles of warehousing performance as mentioned above.

2. Organize regional warehouse as consolidating area for transferring goods in local areas.

3. Organized transportation network and vehicles for consolidating operation with concern in principles performance of transportation

4. Improve and implementation of warehouse management in distribution center by using warehouse management system. The company needs commitment and involvement to built this technology to purchase implement this system with understanding.

5. Implement information technology for communication to customer, both vendor and retailers. Bar coding and EDI can be used for more efficiency in recording and transferring goods information and inventory level to customer.

6. Set up operation of packaging, labeling as value added services in physical distribution and principal method to protect leaking of marketing or promotion information of goods

7. Set up team or responsible person to control and maintain the operations.

5.5 Advantages and Disadvantages designed operation

5.5.1Advantages

1. Financial flexibility

If the manufacturers or retailer operate process of physical distribution by themselves, they need to invest in facilities for warehousing and transportation. The facilities include plant and building for warehousing, transportation vehicles, racks, and material handling. These are fixed cost that companies need to invest for their physical distribution. Also there are some overhead cost and cost of employment as variable cost per month.

Moreover, companies have to provide spaces to meet peak season. Normally, customer demand of each season in a year is different. Therefore, if the companies provide such facilities for themselves as private warehouse, they will handle high cost through out a year though it is not fully used in some seasons.

Therefore, the public distribution provides more flexibility of finance. When companies use services of the public distribution warehouse, they need not to spend much money the assets. They will not spend money for empty space in low season demand. The public distribution warehouse charges a fee base of weight handled. For storage, it will charge for required spaces and weight in storage. Then, with use of the public distribution, the high fixed cost for physical distribution will turn to variable cost.

2. Decrease of variable cost per unit because scale of economy

Variable costs is the cost that relate directly to some level of activities during period of time. The variable cost of physical distribution is on operating of warehouse

and vehicles for movement of load. These cost consist of labor cost, fuel, maintenance etc.

The variable per unit of warehouse and transportation operation is reduce be using the public distribution warehouse because economy of scale. The facilities are shared and utilized by many companies. When the load volume of transportation increase, transport cost per unit of weight decreases.

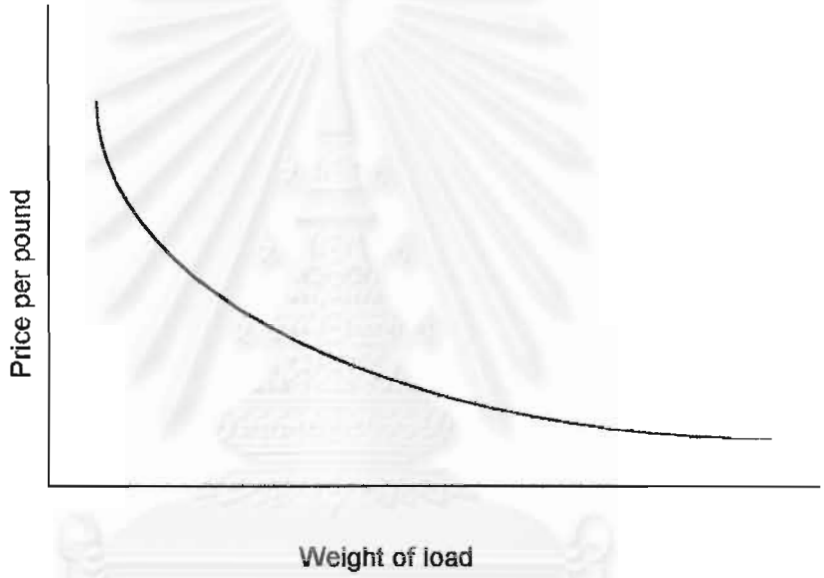

Figure 5.6 show generalized relationship between weight of load with price per pound (Bowersox, D. J. and Closs, D. J., 1996)

According to the figure, when the weight of load increase, cost per unit of transportation will reduce.

Compare with private warehouse, companies establish their own warehouse and operate transportation by themselves but sometime warehouse is not fully utilized

and trucks are not fully loaded because of low demand. That result in high variable cost per unit for physical distribution.

3. Flexibility to change size, location or number of facilities

Use of facilities in public distribution warehouse is very flexible. Customers can change types of rack, size and location. Since demand of goods in each season is different, the public distribution warehouse provides flexibility of size, location or number of facilities for different season demand. The different rack is for different types of product. Therefore, the public distribution warehouse services can quickly response to seasonal demand of customer. Compare with private warehouse that warehouse is relatively fixed because of building, the public distribution warehouse has more benefit of flexibility.

4. Specialization

The public distribution warehouse organization dose only warehouse management and delivery goods so these kind of organization has great specialization in physical distribution. If companies, both manufacturers and resellers, use service such an organization, they can concentrate on what their core business and leave a process of physical distribution to the public distribution warehouse. Therefore, when manufacturers and resellers used such services, one benefit that they will get is ability to concentrate in core business what they do best.

5. Flexibility in rage of services.

Services of public distribution are provided for varieties of situation and they can be organized to meet customer requirement. These services include physical

warehousing, consolidating, breaking buck, warehouse management, regional warehouse management, transportation, packing etc.

Companies can whether use all scope of supply for all services or provide some process by them. According to three phases of transportation, customers can use one or two of them and provide other by themselves. Therefore, the flexibility in range of services is one of advantages of public distribution warehouse.

6. Frequent delivery

Since the company provide services for several products. Large amounts of products are delivered everyday. The delivery trip are provide frequently per day.

7. Reduction of transportation time

Since public distribution warehouse organization provides services for several customers, several goods are required to send same stores or same area. So the truck are fully loaded for one destination. Then, one truck will deliver goods directly to the specific area without stopping in any place. Compare with private warehouse, if the truck are used for one product of one fire, the truck may not be fully loaded. To minimize the expense, the firm may use one truck deliver goods to many places. That will take more delivery time compare with public distribution warehouse.

Moreover, goods may be arranged in regional warehouse previous then when the stores require, the goods can be delivered right away.

Therefore, services of the public distribution warehouse provide timely delivery. The goods will delivered directly to specified place. Then, transportation time is reduced.

8. Expansion of factories in the future

If manufacturer would like to expand their factories, they can use their finished goods warehouse and leave a physical distribution process to the publication warehouse organization. Therefore, the organization serves an expansion of factories very well.

5.5.2 Disadvantages

1. Customer firms lose control of decision making in activities and facilities

Decisions about activities and facilities in the public distribution warehouse organization are made from its internal policy. Customers are not able to control any operation so they will lose ability to integrate the operation with their policy.

2. Customers lose flexibility to adjust operation for unique need.

Since distribution center, regional warehouse and any others facilities are for several type of products, operation have to be provided to serve several needs. Therefore, customers can not adjust procedure for their unique need.

3. Warehouse is not nearby enterprise's building and factories.

Compare with private warehouse that locates nearby factories of enterprise, one of week point of public distribution warehouse is far from their factories. Customers may feel more comfortable to contact warehouse and maintain inventory nearby their locations.

4. It is not common to share resource with competitor.

Since facilities in the public distribution warehouse are for several companies, some customers may compete on same market with same kind of products. When they use same provider, they will absolutely share facilities with each other. Therefore, some companies may not favor to share resources with their competitors.

5.6 Summary

According to the concept of public distribution warehouse, operation of the company needed to suitable to several of products with several companies, both manufacturers and reseller. Conceptual design for the case study company are analyzed from the concept of public distribution warehouse, requirement of customers and constraints that are analyzed and determined in previous chapters. The conceptual design can be separate into warehouse management, which is process of stock goods for customers, transportation, which is process of distribution goods from distribution center to customer stores, and information, which is about communication and the flow of information since order are received. Also, information technology is concerned as important aspect the operation.

Principles and aspects of warehousing, transportation and information is designed base on concept and constraints form chapter 4. Relationships of principles of performance with measures to remedy constraints are summarized as figure 5.7.

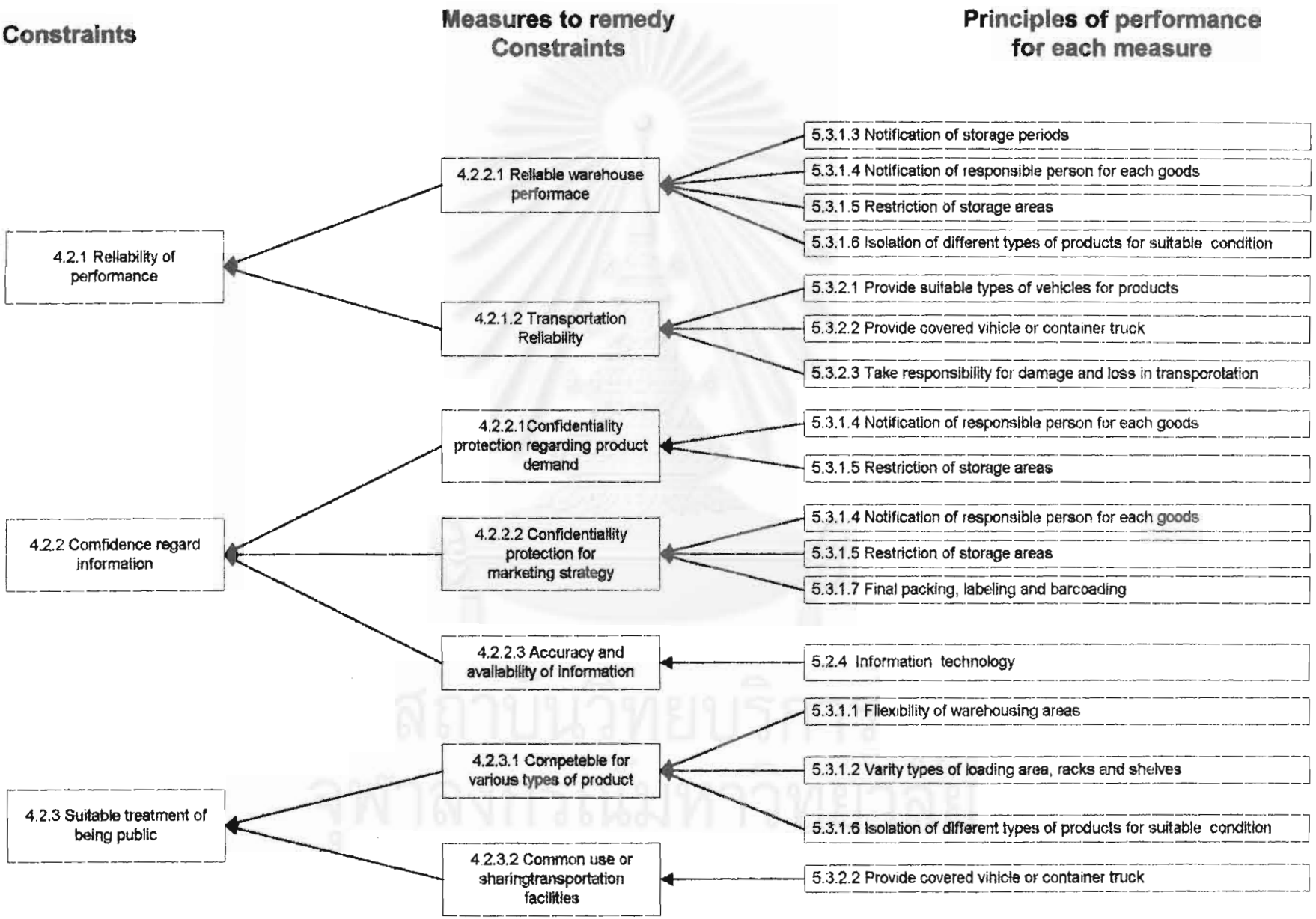

Figure 5.7 Principle of performance for measures to remedy constraints

CHAPTER 6
EVALUATION AND RECOMMENDATION

6.1 Evaluation

The evaluation is done by interviewing with two people.

1. Managerial officer in case study companies who concern about warehousing and distribution for several years. He had to work for manufacturer in warehouse management His opinion present as this sign, *.
2. Managerial official of manufacture company who concern about manufacturers and physical distribution. His opinion present as this sign, #.

Topics that are evaluated are determined as follow:

- Scope of services
- Operation for case study company
- Information technology
- Principal of performance

6.1.1 Scope of service

According to question for agreement of scope of service, the results are as follow:

Table 6.1 Evaluation of scope of service

	Agree	Partially agree	Disagree
- Public warehousing	* #		
- Consolidating	* #		
- Regional warehousing	*	#	
- Transportation	* #		
- Packaging	* #		

6.2.2 Operational process design for case study company

According to the question for completeness of the operational process design, the result are as follow:

Table 6.2 Evaluation of operational process design

	Complete	Not complete
- Receiving	* #	
- Warehousing	* #	
- Picking	* #	
- Distribution	* #	

6.1.3 Information technology

According the use of information technology, necessary of using them are evaluated as follow:

Table 6.3 Evaluation of Information technology

	Necessary	Unnecessary
- Warehouse management Software	* #	
- Bar-coding	* #	
- EDI	* #	

6.1.4 Principal performance

According to principal performance, the effectiveness to reduce constraints and agreement to perform them are as follow:

Table 6.4 Evaluation of principle performance

	Agree	Partially	Disagree
Warehousing performances			
- Flexibility of warehousing area	* #		
- Variety types of loading area rack and shelve	* #		
- Notification of storage periods	* #		
- Notification of responsible person for each goods	* #		
- Restriction of storage area	* #		
- Isolation of different type of product for suitable condition	* #		
- Final packing, labeling and bar-coding	* #		
Transportation performances			
- Provide suitable types of vehicles for products	* #		
- Provide covered vehicle or container truck	* #		
- Take responsibility for damage and loss in transportation	* #		

6.2 Conclusion

This thesis collects information of physical distribution in Thailand form several sources. Current operations of manufacturer, retailers and service provider were collected and summarized. Also, the development of this process was determined in past, present and future in order to design appropriate operation of public distribution warehouse for the case study company. Before designing the conceptual operation, the constraints of public distribution operation are determined. Then, conceptual operation and process are determined. Moreover, according to constraints, measures and performance to remedy each constraint are analyzed and determined. Furthermore, advantages and disadvantages of the operation are summarized.

Obstructions of doing the thesis are about collecting information. Since the public distribution warehouse have not been implemented in Thailand. The information is not available. The collected information of public distribution warehouse is from international journal and Internet. Also, survey of physical distribution operation in Thailand is determined from interviewing with related officers from manufacturers, retailer and service provider. Asking for the interviewing is hardly success because some information is confidential and can not be revealed to unconcerned person.

Moreover, since third party physical distribution provider is not a business that widely establishes in Thailand, information of market survey is not completely available. Most information of market survey and existing situation are collected from related publish document such as newspapers.

6.3 Recommendation

Public distribution warehouse is useful concept that create economic of scale and efficient utilize of facilities. This concept is widely implemented in many countries.

This thesis determines conceptual design of public distribution warehouse for case study company. The operation is base on a development of physical distribution and constraints of implementing such a concept. The company can use this conceptual design to improve its operation and create efficiency operation of physical distribution for its customers.

According to conceptual operation design in this thesis, further development may be done by detail design for the company, creating software for this concept or future analysis of IDEF1. The detail design is an organization of rack or shelve in warehouse, material handling and others warehouse facility by concern of conceptual design and principles performance

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APPENDIX

The appendix A present a question and answers from interviewing with some officer. The list of questions will separates into question for manufacturer, retailer and service provider.

Manufacturer

List of questions

- Would you please explain physical distribution flow of your organization?
- What will you do when you receive order?
- How's about the transportation process for distribution?
- Do you own vehicles for transportation?
- Would you please explain about you warehouse management process?
- Do you have regional warehouses?
- Where are your regional warehouses?
- When order are received, would you please explain about flow process of information?

Example of conversion

Q : Would you please explain physical distribution flow of your organization?

A : First, the finished goods are sent from factories or packaging provider to warehouse. Then, the goods will be delivered directly to customer or regional warehouses. Sometime, fast moving products are not stocked in distribution center, they will be sent to regional warehouses directly. Our direct customers are not end-

users. All of our customers are modern trade retailer as superstore and convenience store and also there are some traditional retail shops.

Q : Would you please explain your transportation?

A : We use subcontractors for transportation process. Also, service provider manages our warehouse. We own warehouse building and all facilities but we use service provider to manage them. Service provider for transportation comes to receive goods at our distribution center. Then, goods will be transfers to smaller truck to be delivered in local areas.

Q : Would you please explain about you warehouse management process?

A : When goods are delivered from factories to warehouse, first we sill check received goods. Then, they are put away to available location. The locations are managed be warehouse management system.

Q: When order are received, would you please explain about flow process of information?

A : Customer order goods pass sale administration. Modern trade customers, which are superstores and convenience stores, order goods via EDI. Traditional retail shops order goods by suing Fax. Then, orders are gathered and keyed to system. Information will be online at distribution center. Then, the deliver order is managed for route and scale of truck for delivery. Then, delivery orders are issued. The order are confirmed and invoice is issued. The goods are loaded in each truck. Finally, the service provider will confirm delivery order of each truck before delivery.

Retailer

List of questions

- Would you please explain order processing when there are demanded from customer?
- How many suppliers that you make contact with?
- What is next process when you goods are delivered from manufacturers?
- Would you please explain detail in receiving process?
- How's about distribution process?

Example of conversation

Q: Fist, we would like to ask you for the order processing when there are demanded from customer?

A : We receive forecasted order from our stores. They forecast customer demand in their shop very month. Then, we will issue purchasing order to suppliers. The purchasing department has authority to deal with manufacturer for selling price, promotion and credits. Also, this department make contact to suppliers for finding new product. Each product that will be sold in the store must be categorized by marketing department. The order of each brunch will sent to head office via Internet. Information technology department will set up code of each goods and prepare goods database.

Q : How many suppliers that you make contact?

A : More than 200 and we have more than 1000 items of goods in each shop.

Q : What is the next process when you goods are delivered from manufacturer?

A : The goods will be stocked in the warehouse. We use warehouse service from service provide, its provider distribution center for us. Goods are warehoused in this distribution center and then they will be distributed to our store branches.

Q : Would you please explain detail in receiving process ?

A : First, we checked the received goods compare with purchasing order. Then, we recorded expire date of each goods. The goods that will be kept in warehouse must have life span before expired date more than two months. If the goods will expire within two months, they will be turned back to their manufacturers. If goods will be expired in two months, manufacturer may get their good back or deal to organize promotion for outlet. Then, the goods will be put away on shelve. Location of goods and operation of warehousing are provided by the service provider.

Q : How do you communicate with your service provider for information of each goods?

A : Our information technology department will define code for each goods. We will communicate and send order by using item code of each goods to distribution center.

Q : How's about distribution process?

A : The service provider will provide distribution process in central region. For other provinces in other regions, goods will be delivered to regional warehouse of the service provider. Then, we will use another transportation service provider to deliver goods in local area.

Service provider

List of questions

- What are kinds of services that you provide?
- What would you do when you receive goods from manufacturer before warehouse them?
- Would you please explain about warehouse management?
- When goods are required for distribution what will you do?
- Who issues an invoice, you or products owner?

Example of conversion

Q : What are kinds of services that you provide?

A : We provide warehouse and distribution service. We have large distribution in central area and regional warehouse in several provinces?

Q : What would you do when you receive goods from manufacturer before warehouse them?

A : After we received goods, we will checked goods compare with ordered. Then, we will check goods description as customer requirement before put away to shelves. Basically, our customers require checking quality of goods and their expired date. Goods have to meet their standard.

Q : Would you please explain about warehouse management?

A : After goods are checked, location of them will be determined. Each goods are record its location, lot number and period before expired. Principles that we use to organize receiving and distributing process are first in first out. The system is controlled by computers.

Q : When goods are required for distribution what will you do?

When distribution center received order to distribution goods. We will check goods and then issue picking list. We will issue invoice because goods are in our warehouse but the invoice is represented in customer behalf. Then, the goods will be delivered to each store.

Biography

Danaya Chantanalertvilai was born in 1977 in Bangkok, Thailand. She completed her undergraduate studies at Kasetsart University in Industrial Engineering. Then, she studied Master of Engineer in Engineering Management and Master of science in Engineering Business Management at The Regional Center for Manufacturing Systems Engineering, Chulalongkorn University.