

**DEVELOPMENT OF INFORMATION SYSTEMS
FOR OTOP DISTRIBUTION CHANNEL**

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Thesis
entitled
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DISTRIBUTION CHANNEL**

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DEVELOPMENT OF INFORMATION SYSTEMS FOR OTOP DISTRIBUTION CHANNEL

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ABSTRACT

One Tambon One Product (OTOP) in Thailand was originally started from One Village One product (OVOP) from Oita province in Japan. Nowadays, OTO producers face many problems, such as having no permanent transportation, an excessively expensive transportation rate, unknown demand from customers and receiving support from neither the government nor private institutes.

According to these problems, information systems were designed to support trading and raw material of OTO products. As well as to promote the exchange of data among OTO producers, traders and customers, who can manage transactions and analyze transportation more easily by using the information system, which is called OTO Distribution Center (OTOPDC). Also designed and developed were e-Marketplace and logistics management tools for export, domestic and district OTO producers. RosettaNet was used as the standard, because it is widely used at present, and was used to develop logistic management for joint buying and selling OTO raw materials and products.

KEY WORDS: OTO / DISTRIBUTION CHANNEL / ROSETTANET

123 pages

การสร้างระบบสารสนเทศเพื่อช่องทางการจำหน่ายสินค้าหนึ่งตำบล หนึ่งผลิตภัณฑ์
DEVELOPMENT OF INFORMATION SYSTEMS FOR OTOP DISTRIBUTION
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บทคัดย่อ

โครงการหนึ่งตำบล หนึ่งผลิตภัณฑ์เป็นโครงการที่มีต้นแบบมาจากหนึ่งหมู่บ้าน หนึ่งผลิตภัณฑ์ของจังหวัดไอโอตะของประเทศญี่ปุ่น ในปัจจุบันโครงการหนึ่งตำบล หนึ่งผลิตภัณฑ์เผชิญกับปัญหามากมาย เช่น ไม่มีรถขนส่งสินค้าหรือวัสดุดิบ ค่าขนส่งแพงเกินไป ไม่ทราบถึงความต้องการของลูกค้าที่แน่นอนและขาดความช่วยเหลือจากรัฐบาลและสถาบันต่างๆ

จากปัญหาต่างๆ ที่เกิดขึ้นในปัจจุบันนี้ ผู้วิจัยได้วิเคราะห์สาเหตุของปัญหาที่เกิดขึ้นแล้วได้ทราบว่าควรจะมีการแบ่งแยกรูปแบบธุรกิจเพื่อใช้แก้ปัญหาที่เกิดขึ้นได้ตรงจุดและใช้ระบบสารสนเทศเพื่อใช้เป็นอีกช่องทางการจัดจำหน่ายสามารถทำการซื้อ ขายสินค้าและวัสดุดิบได้บนระบบสารสนเทศที่ออกแบบขึ้น สามารถทำการแจ้งและแบ่งปันข่าวสารต่างๆจากหน่วยงานต่างๆ และจากตัวผู้ซื้อ ผู้ขายเอง สามารถทำการร่วมซื้อ ร่วมขายได้ ซึ่งระบบสารสนเทศที่ออกแบบขึ้นมานั้นจะแยกตามรูปแบบธุรกิจโดยใช้ชื่อของระบบสารสนเทศที่ได้ออกแบบขึ้นมาคือช่องทางการจำหน่ายสินค้าหนึ่งตำบล หนึ่งผลิตภัณฑ์โดยรูปแบบธุรกิจระดับชุมชนและระดับภายในประเทศจะใช้มาตรฐานการส่งข้อมูลเป็นรูปแบบเอชทีเอ็มแอล ส่วนรูปแบบธุรกิจแบบส่งออกจะใช้มาตรฐานการส่งข้อมูลแบบโรเซตต้าเน็ตที่มีการใช้อย่างกว้างขวางในต่างประเทศ

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CHAPTER I

INTRODUCTION

1.1 Background and Problem Statement

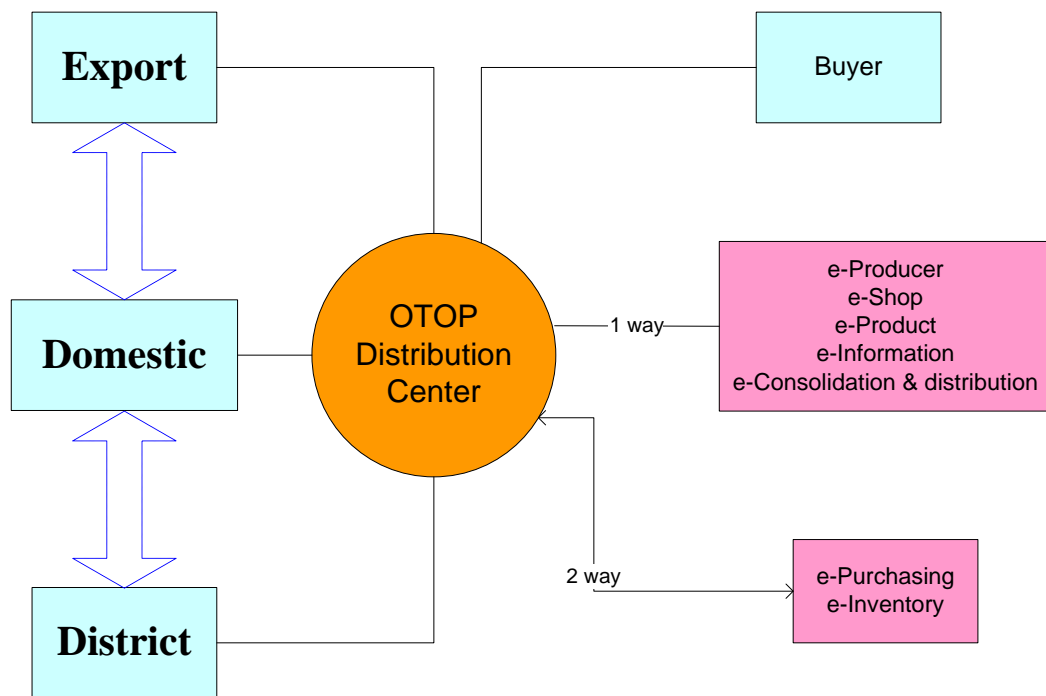
The development of groundwork economic is an important policy for Thai government at this moment. They set policy to push and support OTOP, in order to make its quality acceptable from consumer in all level of marketing latency way in provincial level, national level and export level by managing system into integration project that support technology and marketing management. The government has made One Tambon One Product (OTOP) that creates jobs and income into districts. Thus promotion development from the government which is significant and necessary for creating motivation and invention to develop the district products, including pushing participation in districts and occupational groups to be able to lean on themselves. In order to be success, they need cooperative power of people in the districts and be powerful ability of leader in the group that the government has to support techniques, necessary facilities for foundation and provide assistance for marketing activities. One Tambon One Product (OTOP) in Thailand was originally started from One Village One product (OVOP) of Oita province in Japan. Nowadays OTOP producers face many problems such as having no permanent transportation, too expensive transportation rate, unknown demand from customers and getting neither of support from the government nor private institute.

According to the problems such as having no permanent transportation, too expensive transportation rate, unknown demand from customers and getting neither of support from the government nor private institute. The researcher has designed information systems to solve the problems, support trading and raw material of OTOP products and having exchange data among OTOP producers, traders and customers who can manage transactions and analyses transportation easily by using information system which is called OTOP Distribution Center (OTOPDC).

1.2 Objective of the study

1.2.1 To design an Information system for OTOP Distribution Center.

1.3 Conceptual Framework



1.4 Scope of work

1.4.1 The design of OTOPDC for OTOP product and raw material data exchange system.

1.4.2 Using RosettaNet and HTML standard to exchange data that support the expansion of system that might occur in the future.

1.5 Expected outcome

1.5.1 A design of Information system for OTOP Distribution Center.

CHAPTER II

LITERATURE REVIEW

2.1 Supply chain

Supply chain or logistics network is the system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer. Supply chain activities transform natural resources, raw materials and components into a finished product that is delivered to the end customer. In sophisticated supply chain systems, used products may re-enter the supply chain at any point where residual value is recyclable. Supply chains link value chains. A typical supply chain begins with ecological and biological regulation of natural resources, followed by the human extraction of raw material and includes several production links, for instance; component construction, assembly and merging before moving onto several layers of storage facilities of ever decreasing size and ever more remote geographical locations, and finally reaching the consumer. Many of the exchanges encountered in the supply chain will therefore be between different companies who will seek to maximize their revenue within their sphere of interest, but may have little or no knowledge or interest in the remaining players in the supply chain. More recently, the loosely coupled, self-organizing network of businesses that cooperates to provide product and service offerings has been called the Extended Enterprise. [1, 2]

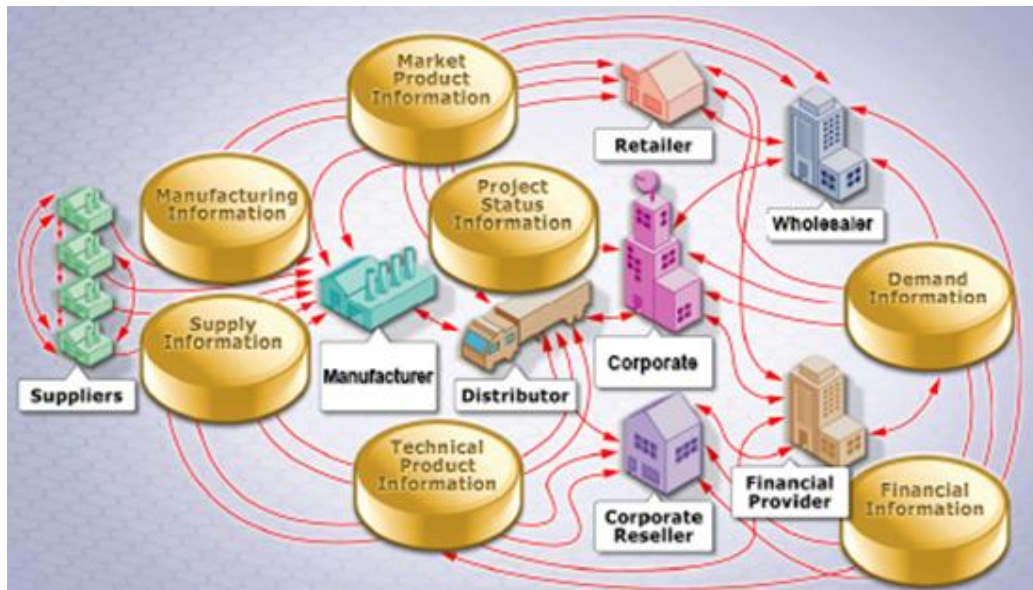


Figure 2.1 Data cycle in supply chain

2.1.1 Supply chain management

Supply Chain Management (SCM) was developed, to express the need to integrate the key business processes, from end user through original suppliers. Original suppliers being those that provide products, services and information that add value for customers and other stakeholders. The basic idea behind the SCM is that companies and corporations involve themselves in a supply chain by exchanging information regarding market fluctuations, production capabilities. The primary objective of supply chain management is to fulfill customer demands through the most efficient use of resources, including distribution capacity, inventory and labor. In theory, a supply chain seeks to match demand with supply and do so with the minimal inventory. Various aspects of optimizing the supply chain include liaising with suppliers to eliminate bottlenecks; sourcing strategically to strike a balance between lowest material cost and transportation, implementing JIT (Just In Time) techniques to optimize manufacturing flow; maintaining the right mix and location of factories and warehouses to serve customer markets, and using location-allocation, vehicle routing analysis, dynamic programming and, of course, traditional logistics optimization to maximize the efficiency of the distribution side. The several companies choose to outsource the logistics aspect of supply chain management by partnering with a 3PL,

Third-party logistics provider. Companies also outsource production to contract manufacturers. [3]

2.2 Logistics

Logistics is the management of the flow of goods, information and other resources, including energy and people, between the point of origin and the point of consumption in order to meet the requirements of consumers (frequently, and originally, military organizations). Logistics involve the integration of information, transportation, inventory, warehousing, material-handling and packaging. Logistics is a channel of the supply chain which adds the value of time and place utility.

In Thailand logistics has 4 activities as follows;

1. Transportation Cost is transport side activity that causes transportation capital. The capital side can be considered in many ways, it depends on institute capital analysis. It can be divided by a kind of customer, product and distribution channel. These capital changes according to shipping quantity, weight, distance, capital and destination. Besides the capital, it might change according to the way and shipping type.

2. Inventory Carrying Cost is an activity that causes keeping inventory cost such as inventory management, packing, repairing, destruction decayed product, etc. The capital that relates to this change will follow by inventory quantity, that can be measured by fund capital, value loses opportunity capital, keeping product capital , and risk capital from keeping products.

3. Warehousing Cost is a capital about the warehouse that consists of choosing place fee to build factory and warehouse, maintenance warehouse and management warehouse cost.

4. Administration Cost is a micro activity such as capital activity that fixes service level to customer, loses sale opportunity capital, procedure capital, data order, etc. Including to procurement capital that consist of procedure orders capital, spreading or sending order, communication, order forecasting and information system development. [4]

2.2.1 Transport Consolidation

All logistic activities that occur from moving out station to another station must consume the resource and cost too much. In the communication to all point, we must use many steps if we can group every points together, so it can be the way to build the most effective innovation. For example, we connect with government sector, it has the overlap trouble that causes time wasting, expenses and many people in an institute. One-stop-service center which is a good way to serve customers to solve problems that occur.

2.3 OTOP

OTOP is One Tambon One Product which is a Thai Government initiative launched in 2001 to identify and promote unique products made by village communities. It is a mean to expand the country's Domestic and International trade, as well as to generate more income to the villagers. OTOP products, wonderful hand-made creations of Thailand myriad village communities, have been refined and brought to the marketplace as attractive handicrafts that are sought-after by both domestic and international buyers. The OTOP movement was originally started in Oita Prefecture in Japan. The purpose of this campaign was to improve upon or refine the locally available resources and produce goods that are acceptable internationally. Inspired by this idea, the Thai government has been promoting the local industry through the manufacturing of attractive specialty products based on the abundant native culture, tradition and nature. Nowadays OTOP producers face many problems such as having no permanent transportation, too expensive for transportation rate, unknown demand from customers and having neither support from the government nor private institute.



Figure 2.2 OTOP Products

2.4 OTOP Express

OTOP Express is a Thailand post project which made to collect top 5 stars OTOP products of each local community throughout Thailand by emphasizing modern design, being Thai identity such as Khannam-planrong, Five primary colours Benjarong jar and ceramics etc. Buyers can choose OTOP products from OTOP Express Catalog and order at any post office that join this project. When chose and order products then OTOP center of Bangkok post office will send products to their home within 7 days as a picture below. [5]

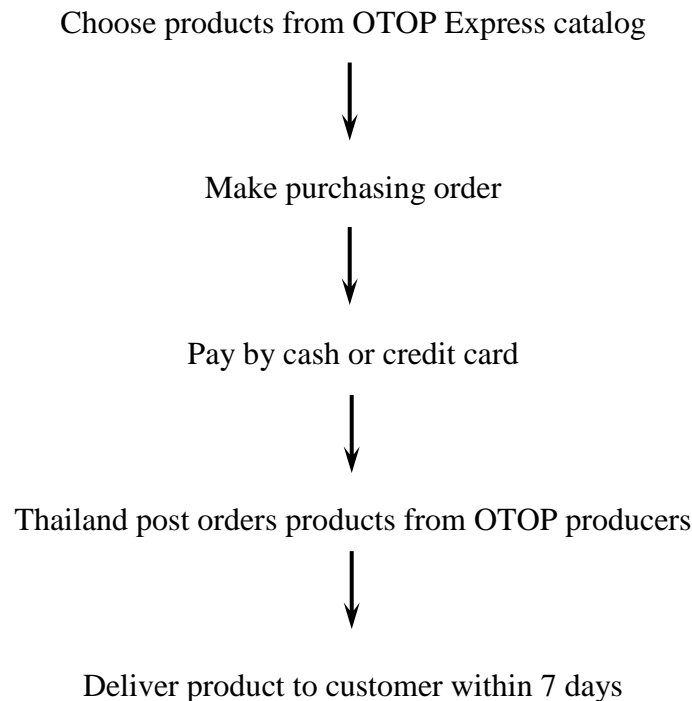


Figure 2.3 Order step of OTOP Express Catalog.

All products that Thailand post sells come from different locations. Thailand post uses the shipping from 11 post office centers in all regions of Thailand. Nowadays this project had been closed down because of many problems such as OTOP producers had not deliver products to company, purchase orders are not good as expected, lack of advertising, etc.

However Thailand post has any service that support to OTOP buyer and seller as follows;

2.4.1 Logispost

Logispost is Thailand post's service for delivering large-sized matter by mail in the country which has undertaking to deliver permission, transmission and lead to delivery that can follow check every practice work step. The character of this service is the user has to bring the matter to deposit and takes it to the post office, which is inside the office and does not have the lead to deliver at location of receiver. The service charge has been calculated follow by weight matter and engages. The matters that can be used in this service are television, motorcycle, furniture, etc. [6]



Figure 2.4 Logispost

2.4.2 Transportation lease

Transportation lease is the lease vehicles from Thailand post for transportation service. The service charge is similar the other. This service can be applied with OTOP raw materials and products transportation. [6]



Figure 2.5 Transportation lease

2.4.3 Roll pallet transportation

Transportation as roll pallet is no weight limit transportation service that puts the matter in roll pallet in any size and service charge base on distance and pallet size.

2.4.4 Good taste all Thailand can order at post office project

Good taste all Thailand can order at post office project is Thailand post project which has been launched on September 1, 2008. It brings famous food from every part of Thailand to sell such as pig sausage and pig bone sausage from Chiang Mai, pork from Nongkai, mooyor from Ubonratchatani, etc. Thailand post has its throughout every area that make convenience for point of order to buy any kind. At the same time, post transport vehicle has to go everywhere to make good transport action, the fresh food day by day and still have Asia airline comes to join as transportation allies, in order to make high quality food.

There are 2 ways to orders as follows;

1. Ordering at the post office and pay order by cash which can order at 158 post offices in Bangkok and the perimeter. In the future, it will be enhanced by adding a menu and enlarge point of order.
2. Ordering from call center and pay via deposit account the aim of service is order today receive in the next day and can order both of very small group and buy a lot for making party. [7]



Figure 2.6 Good taste all Thailand can order at post office project

2.5 e-Commerce

e-Commerce consists of the buying and selling of products or services over electronic systems such as the Internet and other computer networks. The amount of trade conducted electronically has grown extraordinarily since the spread of the

Internet. A wide variety of commerce is conducted in this way, spurring and drawing on innovations in electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web (WWW) at least at some point in the transaction's lifecycle, although it can encompass a wider range of technologies such as e-mail as well. A large percentage of electronic commerce is conducted entirely electronically for virtual items such as access to premium content on a website, but most electronic commerce involves the transportation of physical items in some way. Online retailers are sometimes known as e-tailers and online retail is sometimes known as e-tail. Almost all big retailers have electronic commerce presence on the World Wide Web. Electronic commerce that is conducted between businesses is referred to as business-to-business (B2B). B2B can be open to all interested parties (e.g. commodity exchange) or limited to specific, pre-qualified participants (private electronic market). Electronic commerce that is conducted between businesses and consumers, on the other hand, is referred to as business-to-consumer or B2C. This is the type of electronic commerce conducted by companies such as Amazon.com. Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of the business transactions. e-Commerce consist of 4 type as follows;

2.5.1 Business-to-business (B2B)

Business-to-business (B2B) is a term commonly used to describe commerce transactions between businesses, as opposed to those between businesses and other groups, such as business-to-consumers (B2C) or business-to-government (B2G). More specifically, B2B is often used to describe an activity, such as B2B marketing, or B2B sales, that occurs between businesses and other businesses. The volume of B2B transactions is much higher than the volume of B2C transactions. The primary reason for this is that in a typical supply chain there will be many B2B transactions involving subcomponent or raw materials, and only one B2C transaction, specifically sale of the finished product to the end customer. For example, an automobile manufacturer makes several B2B transactions such as buying tires, glass for windshields, and rubber hoses

for its vehicles. The final transaction, a finished vehicle sold to the consumer, is a single (B2C) transaction.

2.5.2 Business-to-government (B2G)

Business-to-government (B2G) is a derivative of B2B marketing and often referred to as a market definition of public sector marketing which encompasses marketing products and services to government agencies through integrated marketing communications techniques such as strategic public relations, branding, marcom, advertising, and web-based communications. B2G networks allow businesses to bid on government Request for Proposal in a reverse auction fashion.

2.5.3 Business-to-consumer (B2C)

Business-to-consumer (B2C) is activities of businesses serving end consumers with products or services. An example of a B2C transaction would be a person buying a pair of shoes from a retailer. The transactions that led to the shoes being available for purchase, that is the purchase of the leather, laces, rubber, etc. as well as the sale of the shoe from the shoemaker to the retailer would be considered (B2B) transactions.

2.5.4 Consumer-to-consumer (C2C)

Consumer-to-consumer (C2C) is the electronically-facilitated transactions between consumers through some third party. A common example is the online auction, in which a consumer posts an item for sale and other consumers bid to purchase it; the third party generally charges a flat fee or commission. The sites are only intermediaries, just there to match consumers. They do not have to check quality of the products being offered. [8]

2.6 e-Marketplace

e-Marketplace is an electronic exchange where firms register as sellers or buyers to communicate and conduct business over the Internet. For example, firms representing each section in a supply-chain could join an e-Marketplace to transfer

information and purchase products. There are many types of e-Marketplaces based on a range of business models. They may operate on a cost-recovery basis by an independent third party or be setup as a business offering, with a middle-person providing a value-added function such as transaction services. Services offered by e-Marketplaces include business directory listings, electronic catalogues for online purchasing of goods and services and trading or transaction services. e-Marketplaces that are worth considering are those that interconnect with other marketplaces and allow low-cost connection to a firm's financial accounting systems.

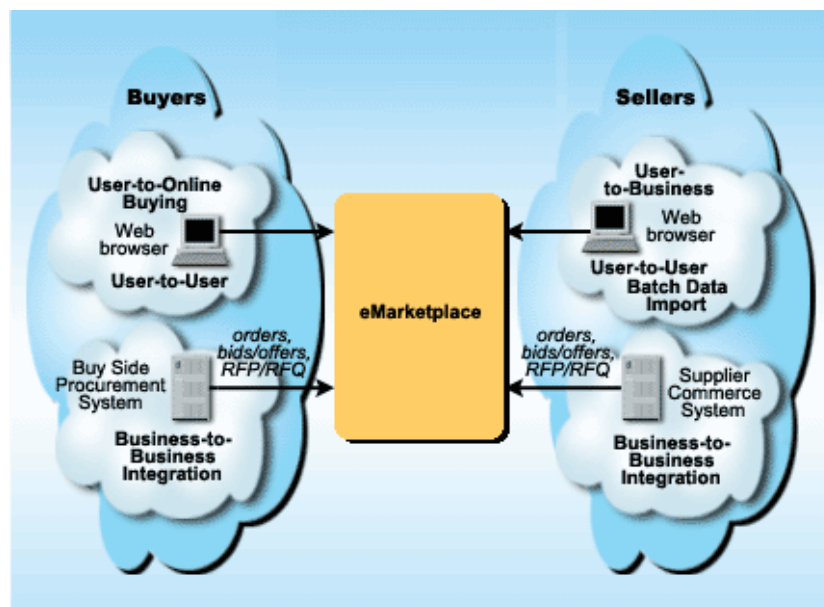


Figure 2.7 e-Marketplace model

2.7 Unified Modeling Language

The Unified Modeling Language (UML) is an open method used to specify, visualise, construct and document the artifacts of an object-oriented software-intensive system under development. UML offers a standard way to write a system's blueprints, including conceptual components such as actors, business processes and system's components, and activities. As well as concrete things such as programming language statements, database schemas, and reusable software components. UML combines the best practice from data modeling concepts such as entity relationship diagrams, business modeling (work flow), object modeling and component modeling.

It can be used with all processes, throughout the software development life cycle, and across different implementation technologies. UML has succeeded the concepts of the Booch method, the Object-modeling technique (OMT) and Object-oriented software engineering (OOSE) by fusing them into a single, common and widely usable modeling language. UML aims to be a standard modeling language which can model concurrent and distributed systems. UML is not an industry standard, but is taking shape under the auspices of the Object Management Group (OMG). OMG has initially called for information on object-oriented methodologies that might create a rigorous software modeling language. Many industry leaders have responded in earnest to help create the standard. It is very important to distinguish between the UML model and the set of diagrams of a system. A diagram is a partial graphical representation of a system's model. The model also contains a semantic backplane documentation such as written use cases that drive the model elements and diagrams. UML diagrams represent two different views of a system model:

Static (Structural) view emphasizes the static structure of the system using objects, attributes, operations and relationships. The structural view includes class diagrams and composite structure diagrams.

Dynamic (Behavioral) view emphasizes the dynamic behavior of the system by showing collaborations among objects and changes to the internal states of objects. This view includes sequence diagrams, activity diagrams and state machine diagrams. [9, 10, 11, 12]

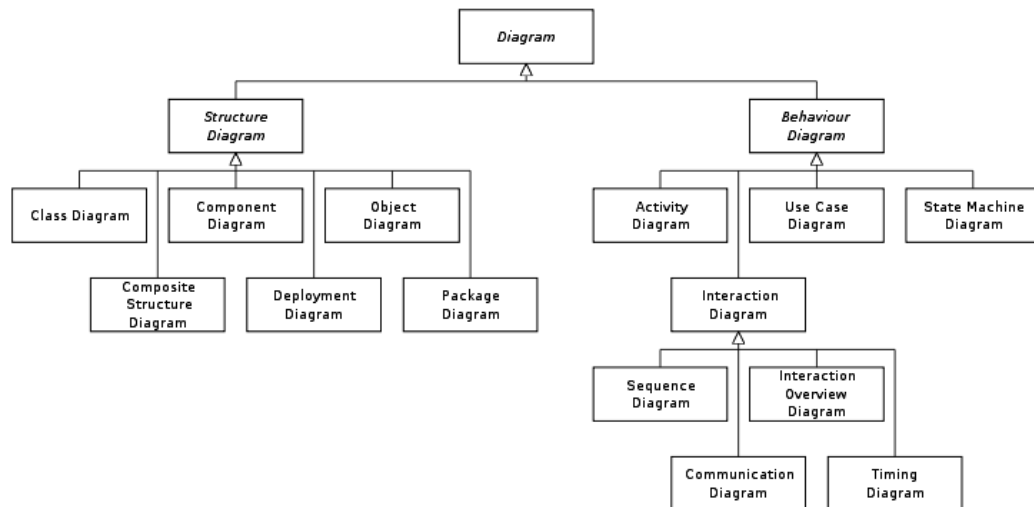


Figure 2.8 UML diagram

2.8 Web service

Web service is defined by the World Wide Web Consortium (W3C) as a software system designed to support interoperable machine-to-machine interaction over a network. Web services are frequently just Web Application programming interface (APIs) that can be accessed over a network, such as the Internet, and executed on a remote system hosting the requested services. Web service as a software system that designed for support data exchange between computers in network system. By the language that use in the communication between a computer is Extensible Markup Language (XML) which have interface for explain data format that a computer can process such as Web Services Description Language (WSDL) computer system is use for communication with the web service that fixed format already which sending data interface might press in Simple Object Access Protocol (SOAP) or in Representational State Transfer (REST) interface. These data usually sent by Hyper Text Transfer Protocol (HTTP) and use XML cooperate with other website standard. Application program that written by every language and platform can use with web service for exchange data in computer network. In primary web service is XML and the majority will use HTTP but may be use other Internet Protocol such as Simple Mail Transfer Protocol (SMTP) and File Transfer Protocol (FTP). XML is a general-purpose specification for creating custom markup languages. It is classified as an

extensible language, because it allows the user to define the mark-up elements. XML's purpose is to aid information systems in sharing structured data, especially via the Internet, to encode documents, and to serialize data; in the last context, it compares with text-based serialization languages such as JavaScript Object Notation (JSON) and Yet Another Markup Language (YAML). Behind web server is XML messages modified for serve middle ware and finally will back to XML again. [9]

Web service consist of 3 part as follows

1. Requestor is who use service for provider that can find service from Universal Description Discovery and Integration (UDDI) Registry, Service Registry or directly contact with provider.
2. Registry is intermediate for provider come to register by use the file of WSDL for explain the company's detail and service that can provide.
3. Provider is facilitator that has duty to opening service for support from Requestor which request service

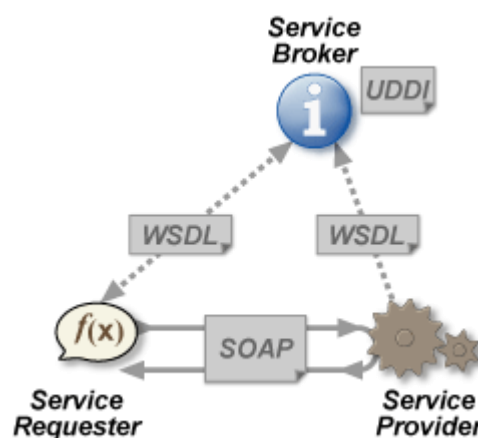


Figure 2.9 Important parts of web service

Software policy and other connectivity standard

1. Simple Object Access Protocol (SOAP) makes use of an Internet application layer protocol as a transport protocol. Both SMTP and HTTP are valid application layer protocols used as Transport for SOAP, but HTTP has gained wider acceptance as it works well with today's Internet infrastructure; specifically, HTTP works well with network firewalls.

2. Universal Description Discovery and Integration (UDDI) was originally proposed as a core Web service standard. It is designed to be interrogated by SOAP messages and to provide access to Web Services Description Language (WSDL) documents describing the protocol bindings and message formats required to interact with the web services listed in its directory.

3. Web Services Description Language (WSDL) defines services as collections of network endpoints, or ports. The WSDL specification provides an XML format for documents for this purpose. The abstract definition of ports and messages are separated from their concrete use or instance, allowing the reuse of these definitions. A port is defined by associating a network address with a reusable binding, and a collection of ports define a service.

2.9 Electronic Data Interchange

Electronic Data Interchange (EDI) is the structured transmission of data between organizations by electronic means. It is more than mere E-mail. It also refers specifically to a family of standards, including the X12 series. However, EDI also exhibits its pre-Internet roots, and the standards tend to focus on American Standard Code for Information Interchange (ASCII) formatted single messages rather than the whole sequence of conditions and exchanges that make up an inter-organization business process. In 1992, a survey of Canadian businesses found at least 140 that had adopted some form of EDI, but that many not benefited from implementing EDI, and that they in fact been disadvantaged by it [10]. The National Institute of Standards and Technology in a 1996 publication defines Electronic Data Interchange as the computer-to-computer interchange of strictly formatted messages that represent documents other than monetary instruments. EDI implies a sequence of messages between two parties, either of whom may serve as originator or recipient. The formatted data representing the documents may be transmitted from originator to recipient via telecommunications or physically transported on electronic storage media.. It goes on further to say that In EDI, the usual processing of received messages is by computer only. Human intervention in the processing of a received message is typically intended only for error conditions, for quality review, and for special situations. For example, the transmission of binary or textual data is not EDI as

defined here unless the data are treated as one or more data elements of an EDI message and are not normally intended for human interpretation as part of online data processing. EDI can be formally defined as the transfer of structured data, by agreed message standards, from one computer system to another without human intervention. Most other definitions used are variations on this theme. Even in this era of technologies such as XML web services, the Internet and the World Wide Web, EDI is still the data format used by the vast majority of electronic commerce transactions in the world. Trading partners are free to use any method for the transmission of documents. In the past one of the more popular methods was the usage of a bisync modem to communicate through a Value Added Network (VAN). Some organizations have used direct modem to modem connections and Bulletin Board Systems (BBS), and recently there has been a move towards using some of the many Internet protocols for transmission, but most EDI is still transmitted using a VAN. In the healthcare industry, a VAN is referred to as a Clearinghouse. EDI and other similar technologies save company money by providing an alternative to, or replacing information flows that require a great deal of human interaction and materials such as paper documents, meetings, faxes, etc. Even when paper documents are maintained in parallel with EDI exchange, e.g. printed shipping manifests, electronic exchange and the use of data from that exchange reduces the handling costs of sorting, distributing, organizing, and searching paper documents. EDI and similar technologies allow a company to take advantage of the benefits of storing and manipulating data electronically without the cost of manual entry. Another advantage of EDI is reduced errors, such as shipping and billing errors, because EDI eliminates the need to rekey documents on the destination side. One very important advantage of EDI over paper documents is the speed in which the trading partner receives and incorporates the information into their system thus greatly reducing cycle times. For this reason, EDI can be an important component of just-in-time production systems.

2.10 RosettaNet

RosettaNet is a non-profit consortium aimed at establishing standard processes for the sharing of business information Business-to-business (B2B). RosettaNet is a consortium of major Computer and Consumer Electronics, Electronic

Components, Semiconductor Manufacturing, Telecommunications and Logistics companies working to create and implement industry-wide, open e-business process standards. These standards form a common e-business language, aligning processes between supply chain partners on a global basis. RosettaNet is a subsidiary of GS1 US, formerly the Uniform Code Council, Inc. (UCC). RosettaNet's 500 members come from companies around the world. The consortium has presence in USA, Malaysia, Europe, Japan, Taiwan, China, Singapore, Thailand and Australia. The RosettaNet standard is based on XML and defines message guidelines, Partner Interface Processes (PIPs), business processes interface and implementation frameworks for interactions between companies. Mostly addressed is the supply chain area, but also manufacturing, product and material data and service processes are in scope. [11]

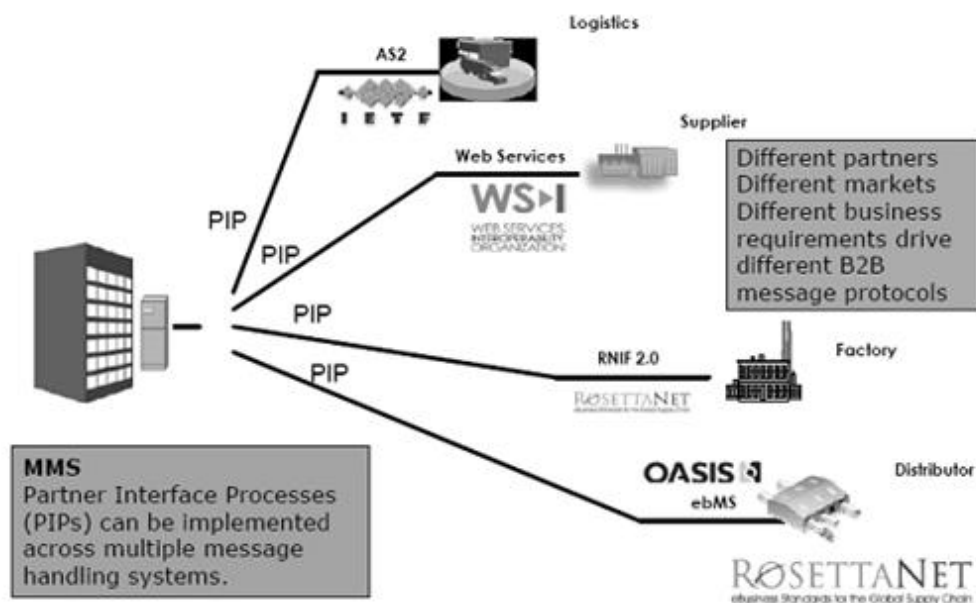


Figure 2.10 Using RosettaNet in different business type organization

RosettaNet Document format will stay in the PIPs (Partner Interface Process) format which PIPs is document in XML format. By this document was sent go to all organization that make business together, it's seem to be sending e-mail to others. RosttaNet organizations divide PIPs messages in 8 clusters as follows ;

Table 2.1 PIPs categories.

Clusters	Segments
0: RosettaNet Support	0A: Administrative 0C: Testing
1: Partner Product & Service Review	1A: Partner Review 1B: Product & Service Review
2: Product Information	2A: Preparation for Distribution 2B: Product Change Notification 2C: Product Design Information 2D: Collaborative Design & Engineering
3: Order Management	3A: Quote & Order Entry 3B: Transportation & Distribution 3C: Returns & Finance 3D: Product Configuration
4: Inventory Management	4A: Collaborative Forecasting 4B: Inventory Allocation 4C: Inventory Reporting 4D: Inventory Replenishment 4E: Sales Reporting 4F: Price Protection
5: Marketing Information Management	5A: Lead Opportunity Management 5B: Marketing Campaign Management
6: Service and Support	6A: Provide and Administer Warranties, Service Packages, and Contract Services 6B: Provide and Administer Asset Management (Merged with 6A) 6C: Technical Support and Service Management
7: Manufacturing	7A: Design Transfer 7B: Manage Manufacturing WO & WIP 7C: Distribute Manufacturing

The document can be divided to explain duty and PIPs metamodel in 3 groups as follows ;

1. Business Operational View (BOV) specifies the semantics of business data entities and the business process flow. It describes start and end states, and partner roles. It describes the interaction between roles, and details security, audit, and process controls. It specifies the business documents and business data entities.

2. Functional Service View (FSV) specifies network component services, agents, and interactions. It provides the network component design required to run the PIPs, and describes possible network component interactions.

3. Implementation Framework View (IFV) specifies network component services, agents, and interactions. It provides the network component design required to run the PIPs, and describes possible network component interactions. [12]

The RosettaNet document exchange has explain in Multiple Messaging Service (MMS) category as 3 types

1. MMS Web Services Profile R11.00.00A
2. MMS ebMS Profile R11.00.00A
3. MMS AS/2 Profile R01.00.00A

This thesis chose RosettaNet data exchange through Web service follow Multiple Messaging Services (MMS) Profile for Web Services standard. This process can divide into 2 ways as follows

1. Service to Service exchange service between services is document transmitter and document receiver can talk can pass service both of sides. This cause can exchange the data crosses connection both of the receiver and document transmitter have to the certainly location (Fixed IP Address).

2. Pure Client to Service exchange document between user and service provide is the user comes into for request service or send document through to serve which base on service provider's side only. The exchange will do finished within the same connection, this cause convenient for requestor that has not certainly location (Non-fixed IP Address). [13]

2.11 Evaluating Hardware, Software and Services

A major activity during the implementation phase of Software Development Life Cycle (SDLC) is the acquisition of the hardware and software necessary to implement the new system. How do companies evaluate and select hardware, software and IT services. Large companies many require suppliers to present bid and proposal based on system specifications developed during the design stage of systems development. Minimum acceptable physical and performance characteristics for all hardware and software requirements are established. Most large business firms and all government agencies formalize these requirements by listing them in a document called an Request For Proposal (RFP) or Request For Quotation (RFQ). Then the send the RFP or RFQ to appropriate vendors, who use it as the basic for preparing a proposed purchase agreement.

Companies may use a scoring system of evaluation when there are several competing proposals for a hardware or software acquisition. They give each evaluation factor a certain number of maximum possible points. Then they assign each competing proposal points for each factor, depending on how well it meets the user's specifications. Scoring evaluation factors for several proposals help organize and document the evaluation process. It also spotlights the strengths and weaknesses of each proposal.

Whatever the claims of hardware manufacturers and software suppliers, the performance of hardware and software must be demonstrated and evaluated. Independent hardware and software information services (such as Datapro and Auerbach) may be used to gain detailed specification information and evaluations. Other users are frequently the best source of information needed to evaluate the claims of manufacturers and suppliers. That's why Internet newsgroups and weblogs established to exchange information about specific software or hardware vendors their products have become one of the best sources for obtaining up-to-date information about the experiences of users of the products.

Large companies frequently evaluate proposed hardware and software by requiring the processing of special benchmark test programs and test data. Benchmarking simulates the processing of typical jobs on several computers and

evaluates their performances. Users can then evaluate test results to determine which hardware device or software package displayed the best performance characteristics.

2.12 Related Research

World Wide Web Consortium (W3C) first published XML 1.0 in 1998. It is a subset of Standard Generalized Markup Language (SGML), for describing information, so computers can easily understand its meanings. XML is good for documents that are structured and for long-term usage and, thus, very applicable for internet applications. [14]

Info Systech Co., Ltd. developed and launched www.thaitambon.com on April 24, 2005. It is the first OTOP website portal that shows OTOP products from every province in Thailand and report OTOP news such as OTOP exhibition, OTOP award products and OTOP producer information, etc. However, this website is not e-Commerce website so buyer cannot buy product from this website.

Felix T.S. Chan and Niraj Kumar have studied Effective allocation of customers to distribution centres: A multiple ant colony optimization approach on February 2, 2006. Distribution centre (DC) plays an important role in maintaining the uninterrupted flow of goods and materials between the manufacturer and customers. The performance of the supply chain network can be easily improved by an effective or balanced allocation of customers to DCs. Improper or unbalanced allocation of customers can lead to the under- or overutilization of facilities and can further deteriorate the customer service. Performance of the DC can be judged on the basis of its ability to provide the right goods, at the right time and at the right place. The lead time or transit time to deliver the goods to the customers is an important parameter for the measuring the efficiency and effectiveness of a particular DC in a supply chain. In this paper, a multiple ant colony optimization (MACO) approach is discussed in an effort to design a balanced and efficient supply chain network that maintains the best balance of transit time and customers service. The focus of this paper is on the effective allocation of the customers to the DCs with the two-fold objective of minimization of the transit time and degree of imbalance of the DCs. [15]

Jing Wang and Yeong-Tae Song have studied Architectures Supporting RosettaNet in 2006 which RosettaNet standards are industry standards for B2B integration. Although it has been adopted by many companies in informational technology, electronic components, and semiconductor manufacturing industries, etc. This research introduces the typical scenario and benefits of using RosettaNet standards, provides a survey on the architectures supporting RosettaNet. They also provide a comparison of these architectures, and propose an architecture supporting RosettaNet using Web services architecture. [16]

Juha-Miikka Nurmilaakso has surveyed EDI, XML and e-business frameworks in 2 March, 2006. The EDI formats have retained a position in cross-industry-document e-business frameworks, whereas the XML format dominates in cross-industry-process e-business frameworks and has gained a footing in industry-specific e-business frameworks. The use of XML-based e-business frameworks has increased more than the use of EDI-based e-business frameworks in 2004. XML-based e-business frameworks are more widely used in the new market economies and EDI-based e-business frameworks in the old market economies. XML-based e-business frameworks are more common in the industries for which there exists an XML-based but no EDI-based industry-specific e-business framework. [17]

Somjit Artin has developed connectivity standard in supply chain and logistics management case study motorcycle's spare parts industry on January 19, 2008. It can improve supply chain and logistics by use RosettaNet standard. [18]

Walailak Atthirawong, Duangpun Singkarin et.al. have researched logistic and supply chain for OTOP products on November 1, 2008. The researcher suggested how to develop business model of OTOP that can be separated into 3 main groups. [19]

According to the research and development of World Web Consortium (W3C) was developed XML standard for more efficiency communication between computers. Info Systech Co., Ltd. developed www.thaitambon.com for a junction of OTOP products so buyer can view more products and producer can communicate with

other producers and buyers too. Felix T.S.Chan and NirajKumar have studied Effective allocation of customers to distribution centres for more efficiency of distribution center by using a multiple ant colony optimization (MACO). Jing Wang and Yeong-Tae Song have studied Architectures Supporting RosettaNet by survey and compare an architecture that suitable and support with RosettaNet standard. Somjit Artin has developed connectivity standard in supply chain and logistics management case study motorcycle's spare parts industry by using RosettaNet standard to link all data and Walailak Atthirawong has research logistics and supply chain for OTOP products. So the researcher chose RosettaNet standard for link all data in supply chain, develop distribution center for each business model for better flow of products and materials between customers and producers than present and study connectivity standard in supply chain and logistics management case study motorcycle's spare parts industry system and www.thaitambon.com to develop OTOP e-Commerce website and portal.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Methodology

In 2001, the government has set policy and promoted OTOP products which have a budget to support equipment, capital and training everything for OTOP producers. New OTOP producers who begin with this policy, mostly of them have not enough mechanism or conceptual object from the government. Such problem makes new OTOP producers are not sustainable and have loose partnership. It depends on ability of group leader, local politicians who make the lack of modern administration knowledge and the misunderstanding in business process. Moreover, OTOP product supporting from the government sector is like the free-of-charge which is not make to see reflect cost and the sale actually. In other ways all group has lack of accountancy that cannot improve and extend work step and knowledge to improve products and merchandising. The OTOP producer does not know potency and market level because they are lack of management knowledge. On the other hand, buyer does not know where to buy OTOP products and the OTOP standard that made from the government and related organization are redundant and disunite such as OTOP Product Champion, OTOP Product Select, OTOP product standard, etc.

3.1.1 Data collection

3.1.1.1 Interview

By the following OTOP products survey and participant organization interview that meet all of product occur from indigenous knowledge and local culture. Then the researchers have to introduce a way to divide OTOP producer into business model for OTOP producer to know who their target customers are, and which level they are in, in order to plan a suitable promotion and marketing, and manufacture product as the market wants.

The method is used to plan and improve business easily. Following survey and researcher analysis that these OTOPs have different characteristics and appearances such as unique OTOP or craft products such as Thai silk and pottery, unique local products such as Chaiya salted egg and Khao Larm Nongmon and general products such as herbal shampoo, coconut jelly, and herbal juice. The OTOP Market in a sense of marketing means a group of customers or a target market of OTOP. They are a group of customers who need or want to buy the product. They have potential, power, and the right to buy the product they intend to buy. Since there are various types of OTOP, and each type has different target market, so that OTOP manufacturers are supposed to define their target which is called marketing segmentation or target customer identification. According to the mentioned survey and analysis, OTOP can divide business model into 3 groups as follows;

1. Export business model was created by folk wisdom, especially identity. It has universal standard package and it is different from any other products that sell in the market. Package of the product is beautiful and durable. Also, it has universal standard according to products group. The products would be sent to sell all over the country via a middleman, institute or sell department.

2. Domestic business model. The product uses raw material in the locality for production and has special identity. It has national level standard, packaging is ordinary, selling to a customer in the province and nearby provinces, tourists and customers who come to an exhibition.

3. District business model. The product uses the raw material in the locality for production, producing goods according to the requirement by people in the community, product price is cheaper than the similar product in the market, most customers are people within the community, and products sale would change store community way, weekend market and direct sale.

First step for producer in each group is they have to find target customer group and stay in the level for pushing sale directly. The OTOP producers might aim customers more than one level. For example, they do both export and domestic level. According to the survey of producer group that proceeds a business for a long time, most of them started from production to meet the requirement level locality customer

before the products has to admit in district level. And then the products gradually enlarge and develop the business to sell domestically and export finally. The researcher also met producers and customers to aim specification more than one level group that would help to decrease the risk of business.

The next step is all groups must consider about customer group, character of products and competitor producer who produce similar products that would make the group can lead the character of product to promote next time. Every group need to know about production and management capital to calculate cost and income.

3.1.1.2 Focus group

After the researcher has studied OTOP's structures [20], the researcher learned that what are problems in every business model. On June 25, 2008, researcher learned the problems from OTOP producers and accomplices that brainstorm in "Development of logistics and supply chain for OTOP products meeting". The main problems are lack of distribution channel, have barriers for OTOP raw material and product trading, lack of communication to exchange opinion to each other, does not know about OTOP events, tax and transportation.

3.1.1.3 Problem analysis

According to the problems from focus group that the researcher can analyzed as shown below.

- Trader and buyer does not know about producer in the market problem.
- Trader and buyer does not know about product in the market problem.
- No update date, time and location for OTOP product exhibition problems. No show standard, rule and policy for OTOP product exportation problems.
- Lack of communication to exchange opinion to each other problem.
- OTOP products are not enough for retail and exhibit shops problems.
- Cannot buy OTOP products from website.

- No distribution center for raw material distribution and inadequate raw material and product distribution way problems.

From these problems the researcher can designed IT functions to solve the problems as shown below and brought IT function to solve the problems in any business model as shown in Table 3.1

1. e-Producer is IT function for solves trader and buyer does not know about producer in the market problem. So the researcher designs this function for keep data of OTOP producers that show the producer's name, location, history and product. They can search from name or location in district and province level.

2. e-Product is IT function for solves trader and buyer does not know about product in the market problem. So the researcher designs this function for keep detail and price of OTOP products that can be found in product type or name. It can separate products in category as follows; food, clothes, utensil, ornament, craft, souvenir and herbs, etc.

3. e-Information is IT function for solves no update date, time and location for OTOP product exhibition problems. No show standard, rule and policy for OTOP product exportation problems. So the researcher designs this function for show news and public relations of OTOP products such as event, news, data, article and technical, etc.

4. Webboard is IT function for solves lack of communication to exchange opinion to each other problem. So the researcher designs this function for exchanging the opinion among producers, stores and customers that can provide information, advertisement and the public relations or ask-reply question to each other.

5. e-Replenishment is IT function for solves OTOP products are not enough for retail and exhibit shops problems. So the researcher designs this function for manage store inventory that can tell product quantity that the seller exist.

6. e-Purchasing is IT function for solves cannot buy OTOP products from website problem. So the researcher designs this function for create invoice, re-invoice and receipt that can be managed online and order on the website.

7. e-Consolidation and distribution is IT function for solves no distribution center for raw material distribution and inadequate raw material and product

distribution way problems. So the researcher designs this function for helps the administration to manage shipping and distributing products. Also, buyers can choose a way for shipping from this system.

Table 3.1 Problems in any business model and IT functions for solving the problems

Problems	IT Functions	Export level	Domestic level	District level
- No update date, time and location for OTOP product exhibition. - No show standard, rule and policy for OTOP product exportation.	e-Information	X	X	X
- OTOP products are not enough for retail and exhibit shops.	e-Replenishment	X	X	
- Cannot buy OTOP products from website.	e-Purchasing	X	X	
- No distribution center for raw material distribution. - Inadequate raw material and product distribution way.	e-Consolidation and Distribution	X	X	X
- Producer does not know about their market and trader.	e-Producer e-Product	X	X	

Table 3.1 Problems in any business model and IT functions for solving the problems (cont.)

Problems	IT Functions	Export level	Domestic level	District level
- Trader does not know about producer in the market	e-Producer e-Product	X	X	
- Lack of communication to exchange opinion to each other	Webboard	X	X	X

3.1.2 System design

This step is ready to make OTOP Distribution Center (OTOPDC) as OTOP product distribution channel and improve efficient logistics management. This OTOPDC will grant privilege user that suitable with every business models and architectures. The Architecture can divided into 2 parts as follows

1. Contents Management System presents all news and information part on the server that give the users and non-users to receive news and information, and they can exchange opinion to each other.
2. Transaction Management is E-Commerce document exchange which is architecture of export business model will use RosettaNet standard, architecture of domestic business model will use HTML standard via e-Marketplace.

Following figure 3.1 shown export business model architecture which has RosettaNet standard for transaction management and another part is html. Figure 3.2 shown domestic business model architecture has html to exchange data. Figure 3.3 shown district business model architecture which has content management part only that use html to exchange data.

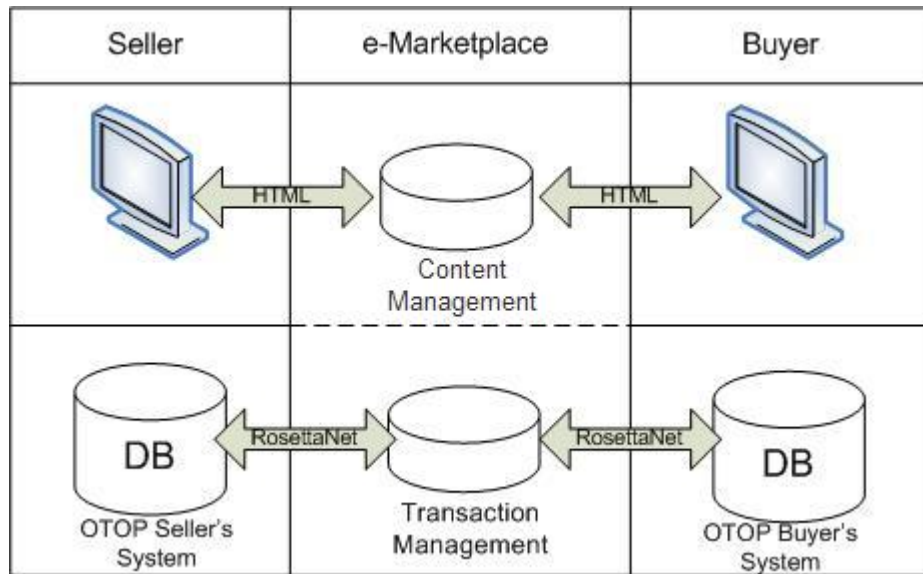


Figure 3.1 Architecture of export business model.

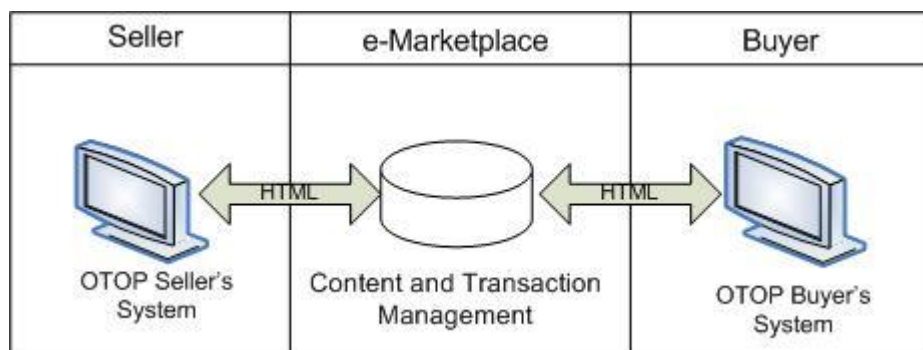


Figure 3.2 Architecture of domestic business mode

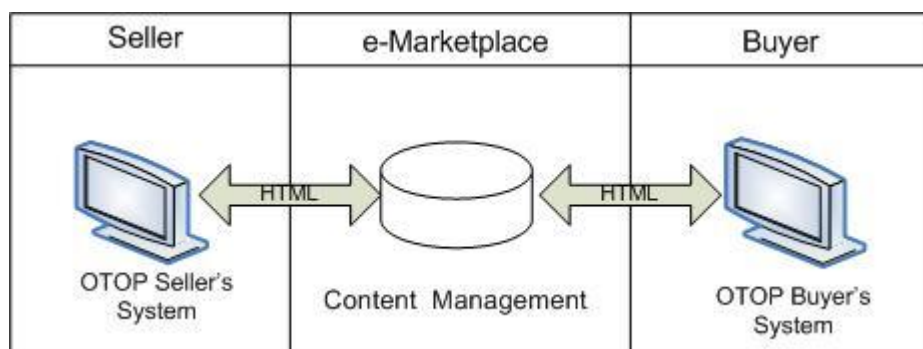


Figure 3.3 Architecture of district business model

3.1.3 Evaluation

After user used OTOP Distribution Center, assign evaluation factor test form Evaluation in Hardware, Software and Services that describes when you evaluate hardware for a new business application, you should find specific physical and performance characteristics for of computer system or peripheral component. Specific questions must be answered concerning many important factors. You should evaluate software according to many factors that are similar to those used for hardware evaluation. Thus, the factors of performance, cost, reliability and technology should be used to evaluate proposed software acquisitions. Most suppliers of hardware and software products and many other firms offer a variety of IS services to end users and organization. Some of these services are provided without cost by hardware manufacturers and software suppliers to Thailandpost user for evaluate software as shown in table 3.2. [20]

Table 3.2 Evaluation factors test.

Rating scale: 5 = Very good, 4 = Good, 3 = Fair, 2 = Poor, 1 = Very poor

Evaluation factors	Rating
	OTOP Distribution Center
Scalability – Can it handle the business processing demands of a wide range of end users, transactions and other information business processing requirements?	
Flexibility – Can it handle your business process easily, without major modification?	
Security – Dose it provide control procedures for errors, malfunction and improper use?	
Quality – Is it attractive, suitable website, or does it have many errors in its program code?	
Hardware – Does existing hardware have the features required to best use this software?	
Maintenance – Will new features and bug fixed be easily implemented by our own software developers?	
Training – Is the necessary training of personnel provided? What are its quality and cost?	
Overall Rating	
Average score	

3.2 Tool used for the study

Hardware

- CPU: Intel Pentium4 2.4GHz
- RAM: DDR 1024 MB
- Hard Disk: 80 GB
- Monitor: VGA Monitor
- Peripherals: Keyboard, Mouse, Printer, Diskette and CD-ROM Drive

Software

- Operating System: Microsoft Window XP
- Designing Program: Microsoft Visio 2003

3.3 Research Schedule

Activities	Time (Months)						
	1	2	3	4	5	6	7
1. Data Collection							
2. System Design							
7. Evaluation							

CHAPTER IV

DATA GATHERING AND ANALYSIS

4.1 Characteristic of OTOP

According to the survey of OTOP business, interview with related people, and government and private agencies who responsible to control and take care of OTOP manufacturers, it was found that most OTOP was originated by local wisdom and culture which is cultural heritage. Most OTOP production has quality that meets the needs of local customers, while high quality products which are popular in the local area would become souvenirs for tourists, and then spread out to other areas. Therefore, OTOPs in the past was given priority to their qualities rather than beauty of package like most products nowadays. Also, the manufacturers did not produce or design their products by considering customer's need.

Since 2002, the government has launched many campaigns to promote OTOP industry and organize groups of OTOP manufacturers. They received various kinds of support from government sectors such as equipments for production, and money support. The government also organized seminars to educate them how to produce, design package, and manage their business. Competition among each kind of products had created many groups of OTOP manufacturers – some groups are old manufacturers and some are new manufacturers. Some groups of new manufacturers used to be in old manufacturer groups, and some groups were found by the government's campaign. However, the latter groups lack of understanding to objectives, mechanism, or concept of the government's campaign and how to run business. As a result, their business is not sustainable. They have to depend on campaign and money support from the government. Cooperation among members in the groups is loose that depends on capability of the groups' presidents and local politicians who support their education about modern management and how to run business. Moreover, support from the government is free-of-charge, so that the selling

products do not reflect the cost of production and actual selling. In addition, most groups lack of education about accounting, so that they are not able to develop and extend their business. They also lack of production planning, product controlling, product management and distribution.

Since these OTOPS have different characteristics and appearances, the researcher suggested how to develop business model of OTOP that can be separated into 3 main groups:

1. Unique OTOP or craft products such as Thai silk and pottery.
2. Unique local products such as Chaiya salted egg and Khao Larm Nongmon.
3. General products such as herbal shampoo, coconut jelly, and herbal juice.

Each manufacturer in first group does not produce great number of products because their products are craftworks that cannot be produced quickly. Their customers or consumers would be proud to own such products. There might be a great deal of manufacturers in second group, but they are in the same area. They can produce products in great numbers. Consumers or tourists usually buy the products as souvenirs for their relatives or respected persons. Products in third groups can be purchased from manufacturers in various provinces. They also can be purchased from enterprise manufacturers (SMEs) or big factory manufacturers. Manufacturers in this group have a risk of production and marketing, because they have a higher cost of production than community enterprises or big factories. Furthermore, they have no good policy of management and quality control system; so that their products cannot compete with SMEs or big factory manufacturers who can produce the same products in great numbers which is good for economy of scale. Moreover, these manufacturers have bargaining powers such as purchasing materials and transportation. Therefore, manufacturers in third group have to improve their management and product quality control to be better than their competitors and define their target market; otherwise, they have to go out of business finally.

OTOP market separation. "Market" in a sense of marketing means a group of customers or a target market of OTOP. They are a group of customers who need or want to buy the product. They have potential, power, and the right to buy the product they intend to buy. Since there are various types of OTOP, and each type has different

target market, so that OTOP manufacturers are supposed to define their target which is called marketing segmentation or target customer identification. According to the mentioned survey and analysis, OTOP customers can be divided into 3 main groups as follows:

1. International customers: foreign customers or Thai customers who live in other countries.
2. Domestic customers: customers who live in nearby provinces or in other regions of the country.
3. Local customers: customers who live in the same area or province.

First, manufacturers need to know who their target customers are, and which level they are in, in order to plan a suitable promotion and marketing, and manufacture product as the market wants. However, a group of OTOP manufactures may have more than one level of target customer. For example, they have both local and domestic customers. According to a survey, it has been found that a group of manufactures who has been running their business for a long time usually started from manufacturing products to respond their local customers needs. After the product has been accepted in local level, it would be spread out and be developed until it becomes domestic or international level. Moreover, it has been found that if they have more than one level of target customer, they would have lesser risk. For example, if they have target customer in international and domestic level, when a situation that stop them from exporting their products, they still have domestic customers. Furthermore, selling products in local area has the least cost per unit, since it needs no transportation or other cost of activities.

Next, manufactures have to consider why their customers buy the products. They have to consider what is their product's strong point? Who are their competitors? How is their product better or more popular than the product of competitors? Therefore, they would use the strong point to promote their selling. And then, they have to calculate their cost of production and cost of management, so as to calculate if they would get a profit or not. This calculation would affect the price of product in each level.

4.2 Composition of business model

Every agency has to design concept for running business to answer what product would they sell, how do they compete with, and how do they make a profit, in order to use as dynamic of agency's management. It would make the highest profit. They need business model to help them see framework of the agency. It can help them to improve process of management or to help the business be more efficient, so that business of the agency would have a goal and know their capability for running business. It would lead to sustainable business. Therefore, manufacturers in each group should create their own business model for OTOP that can be divided into 3 groups as mentioned previously. Each type of OTOP manufacturers have to identify their target customer which has 3 levels. After that, they would choose their business compositions of OTOP in each group.

Data gathering and interview with groups of OTOP manufacturers in this research have 8 compositions of business model for analysis manufacturers' level as follows:

1. Core Capabilities
2. Partner Network
3. Value Configurations
4. Financial Aspects
5. Value Proposition
6. Distribution Channels
7. Customer Relationship
8. Market Segments

The 8 compositions of business model mentioned above can be categorized into 4 groups as follows:

1. Basic structure of OTOP agency or group
2. Products
3. Customers
4. Financial structure

In other words, basic structure of agency includes core capabilities, partner network, and value configurations. Products are considered by their values that are

presented to customers according to their needs. Customers include distribution channels, market segments, and income structure. Compositions of OTOP business model have relationships as be shown in figure 4.1. [19]

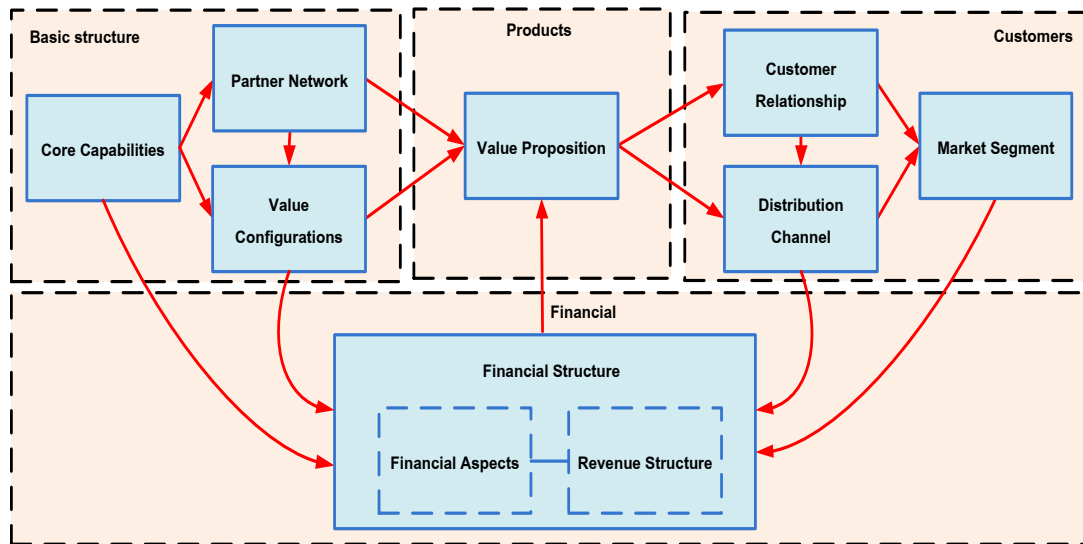


Figure 4.1 Compositions of business model. [19]

1. Basic structure

1.1 Core Capabilities is competency and major factors for running business by using its core capabilities to compete with the same kind of OTOP manufacturers or to add value to product or service.

1.2 Partner Network is cooperation network among OTOP manufacturers or agencies for running business or creating value configurations to create commercialize network that profits competition in the market. It is also a knowledge exchange and cooperation in an agency to improve and develop products in the group. It can make running business faster and help OTOP manufacturers have more time to focus on their main business.

1.3 Value Configurations is efficient business resource distribution and activities that support main business activities. They are activities that respond the agency's needs and create core capabilities such as quality management, general management, factory, facilities, planning, machinery, etc.

2. Finance

2.1 Financial Aspects is procedure of financial and accounting management. Financial aspects are important to OTOP manufacturers and any other entrepreneur, because they would affect profit from running the business, and their business direction. They have to start from considering cost structure which is calculating expenses since receiving order until delivering products to customers' hands. It would lead to invention or developing strategy to search for revenue structure that means methods or guidelines to make profit for sustainable business.

3. Product

3.1 Value Proposition is value of OTOP that responds to customers' needs. The value might include product which has long history, created by local wisdom, or taking a long time and delicacy to produced.

4. Customer

4.1 Distribution Channels is making OTOP manufacturers can sell their products or services to customers easily, and convenient to purchase.

4.2 Customer Relationship is tools or strategies that emphasize on customer's details, in order to make OTOP manufacturers learn and understand customer behavior. Then, the manufacturers could response to their needs, and create pleasure, loyalty, and good attitude towards the manufacturers and the products or services.

4.3 Market Segments is designation of target market and adjusting of market proportion. OTOP manufacturers would see clearly who their competitors in the same market are. Also, manufacturers in a small group would have a chance to prepare themselves according to their limited resources, while manufactures in a large group can use such strategy as well.

Level separation for OTOP manufacturers according to target market does not mean to stop OTOP manufacturers from developing their business model or improving their marketing mix. OTOP manufacturers can develop their business model and improve their marketing mix as demands in every market. However, they should start from developing their business model and improving their marketing mix by selecting target market that is appropriate for their groups' capabilities first, so that

their business would have a clear goal. According to target markets, OTOP manufacturers can be separated into 3 levels as shown in table 4.1

Table 4.1 Category of OTOP manufacturers. [19]

Level	Characteristic
Export OTOP manufacturers	Manufacturers who sell their products in national expo and export their products.
Domestic OTOP manufacturers	Manufacturers who sell their products in the province or nearby provinces.
District OTOP manufacturers	Manufacturers who sell their products in the Tumbon or Amphoe.

Therefore, OTOP business model can be separated into 3 levels according to market segments as shown in figure 4.2

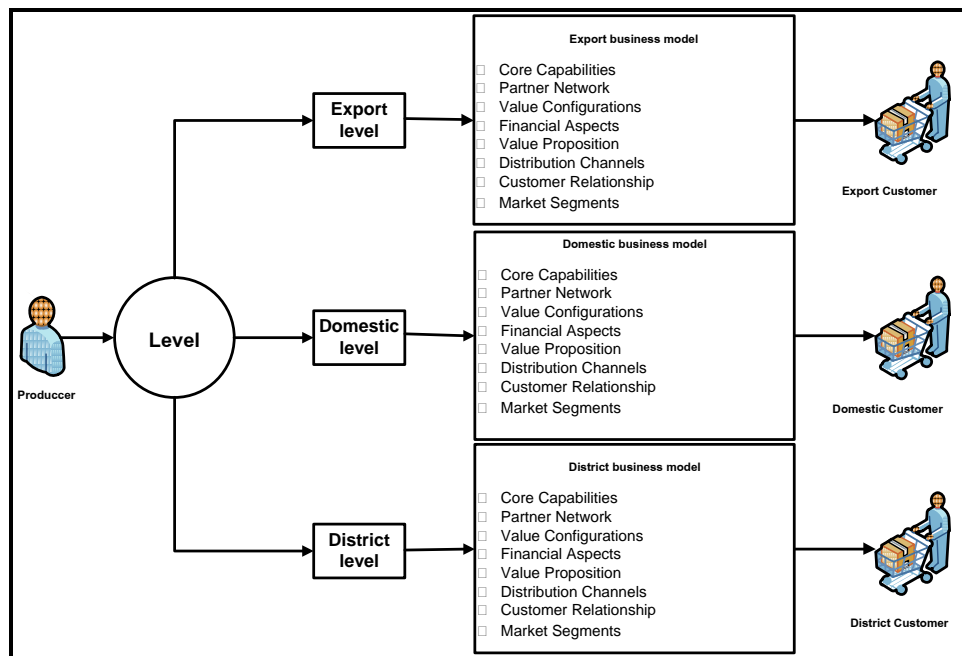


Figure 4.2 Compositions of OTOP business model in 3 levels. [19]

Characteristics of OTOP business management in each level have different compositions.

Table 4.2 Characteristics of manufacturers’ management in each level which is categorized by compositions

Composition	Market level		
	Export	Domestic	Local
Core Capabilities	<ul style="list-style-type: none"> • Always ready for customer’s need. • Be able to communicate with customer in other countries. 	<ul style="list-style-type: none"> • Has main material in the area. • Ready for customer’s need. 	<ul style="list-style-type: none"> • Products are produced in small numbers, so that they are always new. • Products are produced as customer’s need.
	<ul style="list-style-type: none"> • Understand major standard for export products for each country. • Has knowledge and capability for trading and export. 		<ul style="list-style-type: none"> • Products are good and cheap.

Table 4.2 Characteristics of manufacturers’ management in each level which is categorized by compositions (cont.)

Composition	Market level		
	Export	Domestic	Local
Partner Network	<ul style="list-style-type: none"> • Various groups in the network. • Conservative network. • OVOP network. • Department of Export Promotion. • Tourism Thailand , Ministry of Commerce , Department of Trade Negotiations, Thai Customs Department. 	<ul style="list-style-type: none"> • Material manufacturers. • Members in the group. • Government agencies. • Various groups in the network. • Tourism agencies • Private transport companies • Thailand Post • Commercial banks 	<ul style="list-style-type: none"> • Local material manufacturers. • Members in the group. • Government agencies. • Thailand Post. • Local shops

Table 4.2 Characteristics of manufacturers’ management in each level which is categorized by compositions (cont.)

Composition	Market level		
	Export	Domestic	Local
Value Configurations	<ul style="list-style-type: none"> • Has production plan. • Can trace back to the source of material for production. • Plan can be changed as customer’s need. • Has capabilities to produce more products. • New technology or innovation. 	<ul style="list-style-type: none"> • Every piece of products has the same standard. • Production capabilities can be evaluated. • Formula or model of products can be improved and added more variety. 	<ul style="list-style-type: none"> • Products can be produced as local customer’s need. • New products can be produced for local customers.
Financial Aspects (Cost and income structure)	<ul style="list-style-type: none"> • Accounting is done by using information technology • Price of products re the same all over the country. 	<ul style="list-style-type: none"> • Accounting is done, so that cost of every piece of products can be checked. • Products are sold by a distributor. 	<ul style="list-style-type: none"> • Income and expense are recorded. • Members receive percentages from selling products.
Value Proposition	<ul style="list-style-type: none"> • Products are unique because they are produced by local wisdom. 	<ul style="list-style-type: none"> • Products are produced by local and unique materials. • Normal package. 	<ul style="list-style-type: none"> • Products are produced by local and materials. • Products are produced as local customer’s need.

Table 4.2 Characteristics of manufacturers’ management in each level which is categorized by compositions (cont.)

Composition	Market level		
	Export	Domestic	Local
Value Proposition	<ul style="list-style-type: none"> • Universal features. • The products are unique and different from other products in the market. • Packages are beautiful and strong. • The products have international standard according to their category. • Transportation is fast. Be able to produce products as many as customers want. 	<ul style="list-style-type: none"> • Guaranteed by various national standards. • Products are clean. 	<ul style="list-style-type: none"> • The price is lower than other products in the market. • Products are clean.

Table 4.2 Characteristics of manufacturers’ management in each level which is categorized by compositions (cont.)

Composition	Market level		
	Export	Domestic	Local
Distribution Channels	<ul style="list-style-type: none"> • Products are sold via a website. • Products are sold in foreign products expo. • Export by a middleman / an agency / sale department of the company. • Saled in duty free shop inside an airport. • Organize a promotion tourism program 	<ul style="list-style-type: none"> • Products are presented on a website, but they can be ordered by phone or fax. • Sell directly by members in the group. • Product centers in the province. • Product centers in tourist attraction. • Provincial / regional products expo. • Selled via dealer. 	<ul style="list-style-type: none"> • Community shops • Market place • Annual provincial festivals. • Sell directly by members in the group.
Customer Relationship	<ul style="list-style-type: none"> • Use website to increase capabilities for customer service. • Send news and information about products to old customers and target customers. • After sale service. 	<ul style="list-style-type: none"> • Send news and information about date, time, and place of products expo to old customers and target customers. 	<ul style="list-style-type: none"> • Create relationship in the community.

Table 4.2 Characteristics of manufacturers’ management in each level which is categorized by compositions (cont.)

Composition	Market level		
	Export	Domestic	Local
Market Segments	<ul style="list-style-type: none"> • Cutomers in abroad. • Foreign tourists. 	<ul style="list-style-type: none"> • Customers in the province and nearby provinces (Product centers in the province). • Tourists. • Customers in provincial, regional products expo. 	<ul style="list-style-type: none"> • Customer in community.

4.2.1 Export business model

Export OTOP manufacturers who sell their products in national expo and export to other countries, value proposition is the most important. Export OTOP should be created by local wisdom which is unique and represents Thai culture. The product should be different from other products in the market and cannot be copied. Although it represents local wisdom, it has standard features. It should have a clear production plan and has the same quality every time it is produced. Also, it is supposed to have beautiful and strong package which is appropriate for various kind of export according to market segment of a group of export OTOP manufacturers. They should get to understand information about target market, verify information about marketing, and get to understand the information before selling the product. Export OTOP manufacturers who have potential and capabilities for management and production, could aim target customers who are customers in other countries and tourists who come to Thailand. Since export OTOP manufacturers’ management has capabilities of management and production, they can choose target customers in other countries and tourists who come to Thailand. Obviously, there are high competitions

in export market, so they need core capabilities. Export OTOP manufacturers are supposed to be ready to response customer's need on time, be able to communicate with customers in other countries, be able to trade and export, and be aware of major standards for export products for each county. Success of business needs partner network, commercial network, and value network. Business network for export OTOP manufacturers would make strength and cooperation for agencies or institutes in provinces, regions, and countries which is connections and conservative network. OVOP network from other countries would come to help with information exchange. On the other hand, government networks which are Department of Export Promotion, Ministry of Tourism and Sports, Ministry of Commerce, Department of Trade Negotiations, Customs Department, and private agencies, would come to join the network, so as to make export OTOP manufacturers know the procedure of running the business and how to improve their business. Financial and commerce networks are used to increase capability for penetrating target market. Also, export OTOP manufacturers should build a relationship network with distribution agencies in abroad, export agencies, transportation companies (Thailand Post), and commercial banks. After export OTOP manufacturers already have products, target market, and business network, they are supposed to find distribution channels. Distribution channel is one of the most important compositions for selling products to consumers, but each channel could be different that depends on target market. Export OTOP manufacturers have distribution channels such as selling via a website, selling in products expos in abroad, export by themselves or by export agencies, connecting with tourism agencies in order to let foreign tourists come to see their production or buy their products in OTOP centers, and organizing a travel program. Lastly, OTOP manufacturers could make their business be sustainable, but they need to realize, understand, and respond to customer's need at once. Also, they should create customer relationship, in order to please customers of export OTOP manufacturers. They can do this by using a website to spread news and information of their products. This channel can helps with their customer service, and also spreading news or information to their old customers and target customers, or asking for customer's satisfaction in order to improve their products.

4.2.2 Domestic business model

Major market segments of domestic OTOP manufacturers are customers in the province, nearby provinces, and tourists. Most of their main customers know value proposition of their products. Their products are outstanding in provinces or regions such as Khanom Mor Gaeng of Petchaburi and Khao Larm Nong Mon of Chonburi. OTOP manufacturers in this level should give priority to quality, standard, and cleanness of their products.

Core Capability of domestic OTOP manufacturers is the advantage of material provision. Most of main materials are abundant in the area or nearby, and they are ready to respond customer's need. Most distribution channels of products in this level are product centers in the province, product centers in tourist attractions of the province, and provincial or regional expos. Marketing of similar products which have the same distribution channel and target market, the competition would be intense. So the manufacturers should give priority to customer's demand and customer relationship. OTOP manufacturers can do it easily by sending news, date, time, and location, of expos to their old and new customers which is a target group. It is a way to maintain old customers and to get suggestion from customers to improve the products. If manufacturers in this level want to develop or increase capability to respond customer's need, they should consider value configuration. It means they should increase their product's value or increase their capability of business management.

The manufacturers do not need only development, but also partner network, in order to get cooperation and support for finance, product value, requesting standard certification, and market expansion. The partner network includes material providers, government agencies, tourism agencies, private transportation companies or government transportation agency (Thailand Post), and commercial banks who are financial assistants. Domestic OTOP manufacturers are supposed to understand financial aspects, in order to know cost of the product and where their income came from, before finding a way to develop their business.

4.2.3 District business model

District OTOP manufacturers have the advantage of customer relationship, because the relationship between manufacturers and customers is very close, so that they can get information, know the customer's need, and can manufacture products as the customers want. It is core capability of district OTOP manufacturers. If they modify or produce new products from abundant material in the area, they could reduce a great deal of production cost, so that they can sell their products in a low price, which is value configuration.

Market segments in community or nearby area can propose value to customers by many ways such as cleanness of fresh products, producing by customer's need, cheap products, etc. However, if they have partner network such as government agencies that support for various kinds of knowledge, members in the group organize a meeting to exchange knowledge, they would be able to develop their business and live by themselves. Therefore, economic of the community would be better by the basis of sufficiency economy. In addition, some products are taken to sell in other community which is another distribution channel. Moreover, district OTOP manufacturers also sell their products in market places and festivals.

According to the study of district OTOP manufacturers, some groups do not pay attention to financial aspects. For example, they do not know real cost of their products, and some of them set a price lower than the production cost. They should solve the problems, because they prevent the manufacturers in this level from success.

4.3 IT system creation for distribution channels of OTOP

According to the 3 levels of business model, it was found that a factor that would make the business be successful is distribution channel that can distribute products all the way through supply chains. Since nowadays OTOP manufacturers have no regular transportation, because their products are in small numbers. Moreover, a comfortable transportation is too expensive, and they do not know certain customer's need.

Furthermore, there are neither government nor private agencies give them a full support, so most manufacturers have to transport their products by themselves.

To solve such problems, the researcher had designed an IT system to support OTOP trading, so that OTOP manufacturers and customers can exchange information to each other. Therefore, their basic business management and transportation are faster. The IT system called OTOPTDC (OTOP Distribution Center) is a connection system of supply chains and e-marketplace to produce OTOP and develop prototype software which is suitable for supply chains and logistic management of the 3 levels of manufacturers as mentioned. It was found that IT system management as OTOP distribution channel today still has some problems. According to the results of brainstorming and solving the problems by the IT system, it can be concluded as follows:

1) There are no information of time and place of OTOP expos. There are no standard, rule, and regulation of expense to export products to other countries. Each province organizes OTOP expos all the time, in order to let the manufacturers sell their products, and let the customers buy products comfortably. However, they lack of public relations and news announcement. Moreover, if a manufacturer wants to send his products to other places such as other district, other province, other country, etc., but he afraid of expensive transportation expense and tax. Therefore, the researcher had designed an IT Function to present news and announcement of OTOP such as OTOP expo information and academic journals. In addition, standard, rule, regulation, and expense for sending products to other places are presented as e-Information.

2) Products are not enough for selling in souvenir shops or expos. Products for selling in expos or souvenir shops are not enough, because the sellers do not check their stock and estimate selling-buying in advance. Therefore, the researcher had designed an IT Function for stock checking that can tell how much products are in the stock. It also can warn sellers if their products are almost sold out. The function is called e-Replenishment.

3) Cannot order products on website. Nowadays there are many websites of OTOP, but most of them have information which is out-of-date, incorrect, and products cannot be ordered directly. Therefore, the researcher had designed an IT Function that can update information directly by traders. Also, it can do online trading which has purchase order, acknowledgement, and receipt. This online product order function is called e-Purchasing.

4) There are no center for consolidating and distributing products and materials. For OTOP consolidation, sometimes buyers or sellers want to buy materials or products in the same area, but they cannot trade with each other, and do not know how many transportation channels are there. Therefore, the researcher had designed an IT Function that can consolidate products and materials together, and tell how many channels to transport. The function is called e-Consolidation and Distribution.

5) Manufacturers do not know where markets and traders for their products are. On the other hand, buyers and traders do not know who manufacturer products that the market demands, therefore, manufacturers lose a chance and channel to sell their products. Also, buyers and traders cannot buy the products they want, so that the researcher had designed an IT Function that can present information of OTOP manufacturers by name, location, history, and product. They can search for information by name or geographical location in region, province, and Tumbon. It can show details and prices of OTOP by searching in categories of products or product names. OTOP can be categorized as food, beverage, clothes/costumes, commodities/decorations/souvenirs, herbs. The function is called e-Producer and e-Product.

6) Lost of communication and idea exchange between manufacturers and manufacturers, and manufacturers and consumers, so that they cannot share important information such as acceptance of products, demand of products in the market, resources of materials, etc. Therefore, buyers and sellers lose these chances. The researcher had designed an IT Function that they can ask questions to exchange ideas among manufacturers, traders, and customers. Also, it can publish information, advertise, announce, or ask question to each other. The function is called Webboard.

CHAPTER V

RESULTS

5.1 System development

Data collection, problems analysis, and solutions had already been mentioned in chapter 4. Information system for OTOP Distribution was used to solve problems that occurred between producer and producer, and producer and consumer. Steps of system development will be mentioned in this chapter.

5.1.1 Overview

After the researcher had already understood about problems and objectives of IT Function, information system for OTOP distribution channel and OTOP logistics management that was presented by using efficient information technology. In this research, OTOP distribution channel is separated into 3 levels of business models. Each business level has capability according to the needs of buyers and vendors as follows:

Table 5.1 Overview of OTOP Distribution center for export business model.

OTOP Distribution center for export business model
1. Purchasing and payment system via RosettaNet.
2. Consolidation and Distribution center for raw material and product system.
3. News, rule, policy, and Webboard system.
4. Online catalog/shopping cart system.
5. Trader and producer database.
6. Replenishment product system.
7. Built-in search engine on the website

The feature of OTOP Distribution Center (OTOPDC) for export business model as shown in table 5.1 can be described as follows:

1. Purchasing and payment system via RosettaNet is a characteristic of this business which is similar to export business model that is Business-to-Business(B2B). Thus, the researcher used RosettaNet standard that covers all business model process such as purchasing payment and communication.

2. Consolidation and Distribution center for raw material and product system is used in product and raw material consolidation. Users would view the notice in order to seek for consolidation inventor that would reduce expenses for shipping and enhance way for shipping as well. Moreover, it also shows data of distribution products. Both domestic and international buyers and vendors would receive convenience, and their expenses would be reduced as well.

3. News, rule, policy, and Webboard system is the system which is used for notice all information such as news of OTOP expo, rules for export goods shipping that included duty tax, the freight in goods lead, or raw material which is import and export to other country. While webboard is a part which is used for sharing opinion among buyers, vendors, and anyone who is interested in the products and the raw material of OTOP.

4. Online catalog/shopping cart system is the system that vendors can show their goods on the internet and trade, so that anyone can purchase the goods immediately. The system will show pictures, price, and detail of goods that the vendor had inserted such as sweets, clothes, crafts, and decoration, etc. The system can find goods that the buyers want. All they have to do is just type goods' name that they want, in order to find it in the search channel. And then, the goods that exist in OTOPDC would be shown immediately.

5. Trader and producer database is the part which has lists of names, location, products, and details of traders and producers. This data came from traders and producers. An administrator has to add it to the database, so that buyers, producers, and anyone who is interested can view it, and contact with traders and producers.

6. Replenishment product system is the place of system that shows available goods, so that buyers can purchase goods that exist, and vendors would

know when their goods are nearly out of stock. Moreover, they would know the requirement that the buyer has from the amount that the buyer purchased, so that the vendor or the producer would produce enough quantity to support the buyer.

7. Built-in search engine on the website is the system for finding all data on OTOPDC that all users have to do is just type the word they want to find, and then the system would show data such as goods, producer names, place names, information, set of regulation, etc. Therefore, the users can find information easily and according to requirement.

Table 5.2 Overview of OTOP Distribution center for domestic business model

OTOP Distribution center for domestic business model.
1. Purchasing and payment system via HTML.
2. News, rule, policy, and Webboard system.
3. Online catalog/shopping cart system.
4. Producer database.
5. Replenishment product system.
6. Consolidation and distribution center for raw material and product system.
7. Built-in search engine within the website

The Features of OTOP Distribution Center (OTOPDC) for domestic business model as shown in table 5.2 can be described as follows:

1. Purchasing and payment system via HTML is the trading system for vendors and buyers to trade with each other via OTOPDC, by using HTML as a way for transmitting data. The procedures for trading are shown as follows:

1.1 The buyer chooses goods, and then makes an order.

1.2 The buyer chooses how to pay and distribution way for transporting goods.

1.3 OTOPDC system will send the purchase order to the vendor.

1.4 The vendor receives and ship goods to the buyer, and then the system would change purchase orders status automatically, in order to let the buyer knows the current status of buying goods.

This system will help buyers to select goods they want, and vendor can enhance the way for trading as well.

2. News, rule, policy, and Webboard system is the system for notice all information such as news of OTOP expo, rules for export goods shipping that includes duty tax, the freight in goods lead or the raw material which is import and export to other country. Webboard is the part for sharing opinion among buyers, vendors, and anyone who is interested in the products and the raw material of OTOP.

3. Online catalog/shopping cart system is the system that vendors can show their goods on the internet and trade, so that anyone can purchase the goods immediately. The system will show pictures, price, and detail of goods that the vendor had inserted such as sweets, clothes, crafts, and decoration, etc. The system can find goods that the buyers want. All they have to do is just type goods' name that they want, in order to find it in the search channel. And then, the goods that exist in OTOPDC would be shown immediately.

4. Trader and producer database is the part which has lists of names, location, products, and details of traders and producers. This data came from traders and producers. An administrator has to add it to the database, so that buyers, producers, and anyone who is interested can view it, and contact with traders and producers.

5. Replenishment product system is the place of system that shows available goods, so that buyers can purchase goods that exist, and vendors would know when their goods are nearly out of stock. Moreover, they would know the requirement that the buyer has from the amount that the buyer purchased, so that the vendor or the producer would produce enough quantity to support the buyer.

6. Consolidation and Distribution center for raw material and product system is used in product and raw material consolidation. Users would come to the notice in order to seek for consolidation inventor that would reduce expenses for shipping and enhance way in the shipping as well. Moreover, it also shows data of

distribution products. Both domestic and international buyers and vendors would receive convenience, and their expenses would be reduced as well.

7. Built-in search engine on the website is the system for finding all data on OTOPDC that all users have to do is just type the word they want to find, and then the system would show data such as goods, producer names, place names, information, set of regulation, etc. Therefore, the users can find information easily and according to requirement.

Table 5.3 Overview of OTOP Distribution center for district business model.

OTOP Distribution center for district business model.
<ol style="list-style-type: none"> 1. News, rule, policy, and Webboard system. 2. Consolidation and distribution center for raw material and product system.

1. News, rule, policy, and Webboard system is the system for notice all information such as news of OTOP expo, rules for export goods shipping that includes duty tax, the freight in goods lead or the raw material which is import and export to other country. Webboard is the part for sharing opinion among buyers, vendors, and anyone who is interested in the products and the raw material of OTOP.

2. Consolidation and Distribution center for raw material and product system is used in product and raw material consolidation. Users would come to the notice in order to seek for consolidation inventor that would reduce expenses for shipping and enhance way in the shipping as well. Moreover, it also shows data of distribution products. Both domestic and international buyers and vendors would receive convenience, and their expenses would be reduced as well.

5.1.2 Requirement of the system

We have already known about the flows of OTOP Distribution system which is divided by business model. This section will mention about the user requirement in the system, IT Function in each business model which is made

according to requirement of buyers, vendors, and anyone who is involve with OTOPDC. Requirement of the system for each business model can be summarized as follows:

5.1.2.1 Requirement of the system for export business model

1) e-Information

e-Information is a function for users who want to show data and information to buyers, vendors, and anyone who is interested.

System: e-Information
Module: Data and news source
Objective: To send data about OTOP, news, and information to buyers and vendors.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. The system can send news and OTOP information from the website of Ministry of Commerce and the Department of Foreign Trade such as news about expo, rules, regulations, and expenses for export and import products, etc. 2. Can associate information with relevant agencies, and conduct with links to those agencies. 3. Update or add news. 4. Have notification of date and time for location of events.

2) e-Replenishment

e-Replenishment is a function for buyers and sellers to show the number or volume of available products, so that buyers can purchase the correct amount, and sellers will know of volume and demand of their products.

System: e-Replenishment
Module: Notification of available goods.
Objective: To let buyers and sellers know the number or volume of available products.

Requirement:

1. To inform sellers for available goods and amount of items that the buyers want to purchase. It let the seller knows the amount of their available products and identify the demand of their products by viewing volume of purchase orders in each time.
2. Notify sellers when product amount is running low.
3. Seller can edit goods amount that increase or decrease the number of products in the system.

3) e-Purchasing

e-Purchasing is function for buyers and sellers who want to trade on the internet, because it can be used as another channel for trading.

System: e-Purchasing
Module: Connecting goods and raw materials purchasing and selling system together.
Objective: To provide a channel for buying and selling goods and raw materials.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can order directly on the website that can create receipt order, invoice, and show order status. <p>Requirement:</p> <ol style="list-style-type: none"> 2. Have another trade of goods and raw materials. Paid via transferal or a credit card. 3. To make the system secure and reliable.

4) e-Consolidation and Distribution

e-Consolidation and Distribution is a function for buyers and sellers who want to have a joint venture transportation for buying or selling raw materials and products in the same area, in order to reduce the cost of trading goods and raw materials, and to know where distribution centers are.

System: e-Consolidation and Distribution
Module: Connecting transportation of consolidate products and raw materials together.
Objective: To make consolidation products and raw materials, and identify distribution centers in various locations.
Requirement: <ol style="list-style-type: none"> 1. Can manage transportation distribution and consolidation of raw materials and products in the same area, in order to reduce the cost of trading goods and raw materials. 2. To identify distribution centers in various locations for convenience and savings logistics cost. 3. To identify routes and methods of shipping to any locations.

5) e-Producer

e-Producer is a function for sellers to show their history and location to buyers or anyone who is interested, and make a contact.

System: e-Producer
Module: Detail of producer.
Objective: To identify the manufacturer's product information.
Requirement: <ol style="list-style-type: none"> 1. Can add and display information of OTOP producers, show manufacturer's name, location, and products. 2. Can search for producer information by putting name or location such as province, district, and country. 3. Can link between consumers and producers. 4. Can edit or add information of sellers.

6) e-Product

e-Product is a function for sellers who want to promote products that can attach image by themselves. Also, they can insert product information and price for buyers or anyone who is interested to view and buy.

System: e-Product
Module: Information and details of products.
Objective: To display information, prices, and details of products.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can show details, pictures, and prices of OTOP products that can be classified as follows: food, beverage, fabric, apparel, furnishings, souvenirs, non-food, and herbs. 2. Can find type of product or product name. <p>Requirement:</p> <ol style="list-style-type: none"> 3. Can link between products and producers. 4. Can edit or add information of product.

7) Webboard

Webboard is a function for buyers, sellers, and traders who want to create topics, so as to exchange data, news, and ideas.

System: Webboard
Module: Exchange information and ideas.
Objective: To exchange information and opinions of buyers and sellers.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can create topics for sharing ideas among manufacturers and customers, and put advertisement. 2. Can find and post comments in the topic. 3. Can let people to see and edit or delete information that is inaccurate. 4. Anyone can question, comments, and edit their own information.

5.1.2.2 Requirement of the system for domestic business model

1) e-Information

e-Information is a function for users who want to show data and information to buyers, vendors, and anyone who is interested.

System: e-Information
Module: Data and news source
Objective: To send data about OTOP, news, and information to buyers and vendors.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. The system can send news and OTOP information from the website of Ministry of Commerce and the Department of Foreign Trade such as news about expo, rules, regulations, and expenses for export and import products, etc. 2. Can associate information with relevant agencies, and conduct with links to those agencies. <p>Requirement:</p> <ol style="list-style-type: none"> 3. Update or add news. 4. Have notification of date and time for location of events.

2) e-Replenishment

e-Replenishment is a function for buyers and sellers to show the number or volume of available products, so that buyers can purchase the correct amount, and sellers will know of volume and demand of their products.

System: e-Replenishment
Module: Notification of available goods.
Objective: To let buyers and sellers know the number or volume of available products.

Requirement:

1. To inform sellers for available goods and amount of items that the buyers want to purchase. It let the seller knows the amount of their available products and identify the demand of their products by viewing volume of purchase orders in each time.
2. Notify sellers when product amount is running low.
3. Seller can edit goods amount that increase or decrease the number of products in the system.

3) e-Purchasing

e-Purchasing is function for buyers and sellers who want to trade on the internet, because it can be used as another channel for trading.

System: e-Purchasing
Module: Connecting goods and raw materials purchasing and selling system together.
Objective: To provide a channel for buying and selling goods and raw materials.
Requirement:
<ol style="list-style-type: none"> 1. Can order directly on the website that can create receipt order, invoice, and show order status. 2. Have another trade of goods and raw materials. Paid via transferal or a credit card. 3. To make the system secure and reliable.

4) e-Consolidation and Distribution

e-Consolidation and Distribution is a function for buyers and sellers who want to have a joint venture transportation for buying or selling raw materials and products in the same area, in order to reduce the cost of trading goods and raw materials, and to know where distribution centers are.

System: e-Consolidation and Distribution
Module: Connecting transportation of consolidate products and raw materials together.
Objective: To make consolidation products and raw materials, and identify distribution centers in various locations.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can manage transportation distribution and consolidation of raw materials and products in the same area to reduce the cost of trading goods and raw materials. 2. To identify distribution centers in various locations for convenience and savings logistics cost. 3. To identify routes and methods of shipping to any locations.

5) e-Producer

e-Producer is a function for sellers to show history and location to buyers or anyone who is interested, and make a contact.

System: e-Producer
Module: Detail of producer.
Objective: To identify the manufacturer's product information.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can add and display information of OTOP producers, show manufacturer's name, location, and products. 2. Can search for producer information by putting name or location such as province, district, and country. 3. Can link between consumers and producers. 4. Can edit or add information of sellers.

6) e-Product

e-Product is a function for sellers who want to promote products that can attach images by themselves. Also, they can insert product information and price for buyers or anyone who is interested to view and buy.

System: e-Product
Module: Information and details of products.
Objective: To display information, prices, and details of products.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can show details, pictures, and prices of OTOP products that can be classified as follows: food, beverage, fabric, apparel, furnishings, souvenirs, non-food, and herbs. <p>Requirement:</p> <ol style="list-style-type: none"> 2. Can find type of product or product name. 3. Can link between products and producers. 4. Can edit or add information of product.

7) Webboard

Webboard is a function for buyers, sellers, and traders who want to create topics, so as to exchange data, news, and ideas.

System: Webboard
Module: Exchange information and ideas.
Objective: To exchange information and opinions of buyers and sellers.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can create topics for sharing ideas among manufacturers and customers, and put advertisement. 2. Can find and post comments in the topic. 3. Can let people to see and edit or delete information that is inaccurate. 4. Anyone can question, comments, and edit their own information.

5.1.2.3 Requirement of the system for district business model

1) e-Information

e-Information is a function for users who want to show data and information to buyers, vendors, and anyone who is interested.

System: e-Information
Module: Data and news source
Objective: To send data about OTOP, news, and information to buyers and vendors.
<p>Requirement:</p> <ol style="list-style-type: none"> 1. The system can send news and OTOP information from the website of Ministry of Commerce and the Department of Foreign Trade such as news about expo, rules, regulations, and expenses for export and import products, etc. 2. Can associate information with relevant agencies, and conduct with links to those agencies. 3. Update or add news.

2) e-Consolidation and Distribution

e-Consolidation and Distribution is a function for buyers and sellers who want to have a joint venture transportation for buying or selling raw materials and products in the same area, in order to reduce the cost of trading goods and raw materials, and to know where distribution centers are.

System: e-Consolidation and Distribution
Module: Connecting transportation of consolidate products and raw materials together.
Objective: To make consolidation products and raw materials, and identify distribution centers in various locations.

<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can manage transportation distribution and consolidation of raw materials and products in the same area, in order to reduce the cost of trading goods and raw materials. 2. To identify distribution centers in various locations for convenience and savings logistics cost. <p>Requirement:</p> <ol style="list-style-type: none"> 3. To identify routes and methods of shipping to any locations.

3) Webboard

Webboard is a function for buyers, sellers, and traders who want to create topics, so as to exchange data, news, and ideas.

<p>System: Webboard</p>
<p>Module: Exchange information and ideas.</p>
<p>Objective: To exchange information and opinions of buyers and sellers.</p>
<p>Requirement:</p> <ol style="list-style-type: none"> 1. Can create topics for sharing ideas among manufacturers and customers, and put advertisement. 2. Can find and post comments in the topic. 3. Can let people to see and edit or delete information that is inaccurate. 4. Anyone can question, comments, and edit their own information.

5.1.3 Infrastructure of OTOP Distribution Center

This topic covers infrastructure of OTOP Distribution Center which is divided into 2 parts. Individual infrastructure in each business model includes IT Function.

5.1.3.1 Contents Management System is a part of information service (Server) that presents to user or source that provides both members or non-members. It can recognize information and data, and can be commented or asked

questions, including, IT Function such as e-Information, e-Replenishment, e-Consolidation and Distribution, e-Producer, e-Product, and Webboard. The district business only has the following IT Function: e-Information, e-Consolidation and Distribution, and Webboard.

5.1.3.2 Transaction Management is a part of exchange trading and electronic commerce of procedure document such as invoices, purchase order, accepted order, etc. In export business model, RosettaNet standard documentation architecture is used. Domestic business model is based on HTML architecture in the document of IT Function.

Picture 5.1 shows Infrastructure of export business model in a part of the Contents Management System that uses HTML to transmit data and Transaction Management using RosettaNet for data transfer. Picture 5.2 shows infrastructure of domestic business model which has 2 contents – Management System and Transaction Management that send data through HTML. Picture 5.3 shows Infrastructure of district business model that has only a single content – Management System, and using HTML for transmitting data.

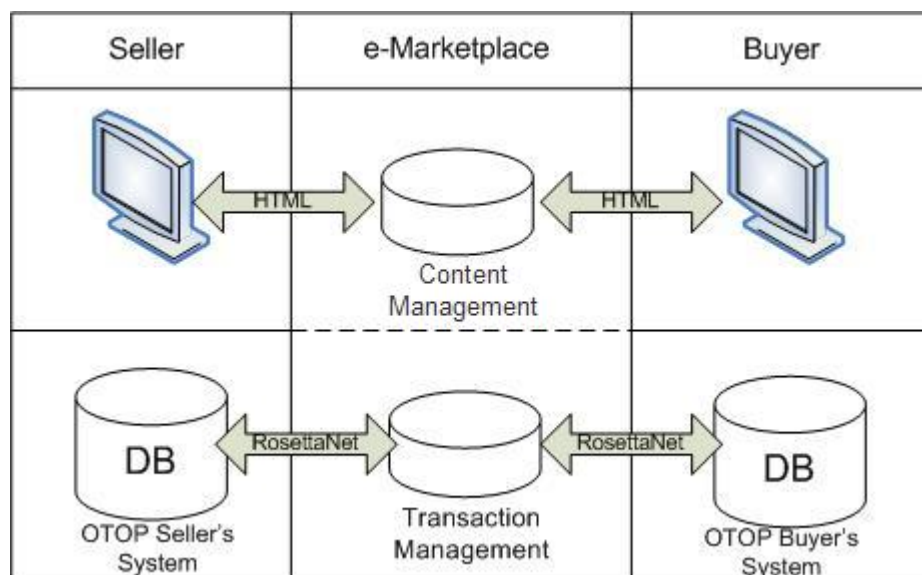


Figure 5.1 Infrastructure of export business model

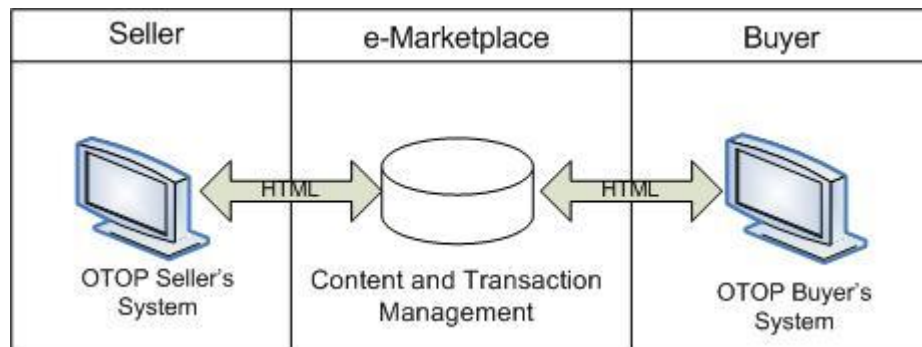


Figure 5.2 Infrastructure of domestic business model

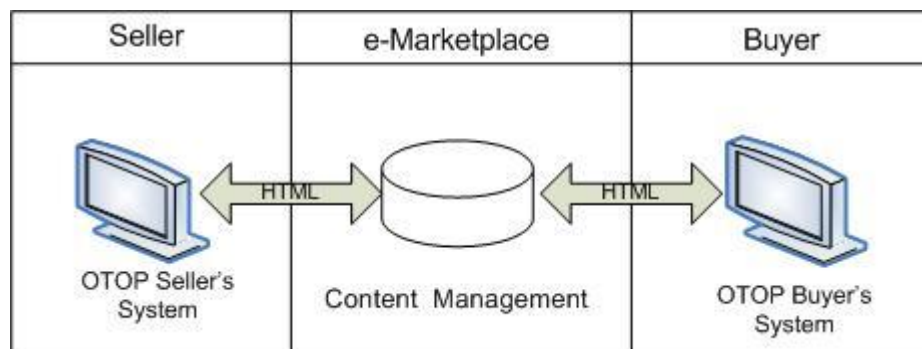


Figure 5.3 Infrastructure of district business model

5.1.4 Process model

In this section, the researchers will explain work process and authority of all OTOP Distribution Center’s relevant system by starting from the OTOP Distribution Center registration, viewing purchasing, and selling information. Business model can be divided as follows:

5.1.4.1 Process model of user in export business model

Workflow and step of use for anyone who is interested or buyers of OTOP products in export business model are shown as follows:

1. Users login to the OTOPDC website by registering as a new user for the first time, and signing in by filling username and password which was shown up previously, or not to login.
2. When a user chooses to login or register in the system, the system will record and check username and password if it is correct or not. If it is

correct, the user will be allowed to login. If it is incorrect, the user can enter again, by a user login called register. When a new user finish filling in, the system will check the accuracy, and then allow users to sign in as a registered member. Username and password will be sent via e-mail automatically.

3. In this process, a user has to be involved with 2 types of system 3.1.Register, 3.2.User which has a privilege of the system on each type are shown as follows:

3.1 Register

1. Register can access for viewing information and regulations on e-Information.

2. Register can visit to view and purchase products by the following process:

2.1 Select interested products to purchase.

2.2 Select payment method and type of transportation and view consolidation on e-Consolidation.

2.3 Distribution process will be completed when a purchased order is sent to the seller. It will be proceeded to communicate by using the commercial IM application client which is created by RosettaNet messaging standards in PIP3A4 Purchase Order Request & Confirmation, PIP3C3 Notify of Invoice and PIP4C1 Distribute Inventory Report as shown in Figure 5.6, 5.9, and 5.11.

3. Register can select seller's information which can be searched by checking for product location and name of product sellers. Also, sellers' information can be linked to other products.

4. Register can purchase OTOP product on OTOPDC by a process shown in Article 3.2

5. Register can visit and use consolidation by browsing consolidation that interested and contact to join consolidation at the Register announced to share consolidation together.

6. Register can see the number of products which is available in the system via e-Replenishment.

7. Register can visit and comment in the webboard system.

3.2 User

1. User can access to view information and regulations on e-Information.
2. User can access to view OTOP products.
3. User can access to view OTOP producer's information.
4. User can access to view and use e-Consolidation and distribution.
5. User can access to view topic and comment in webboard.

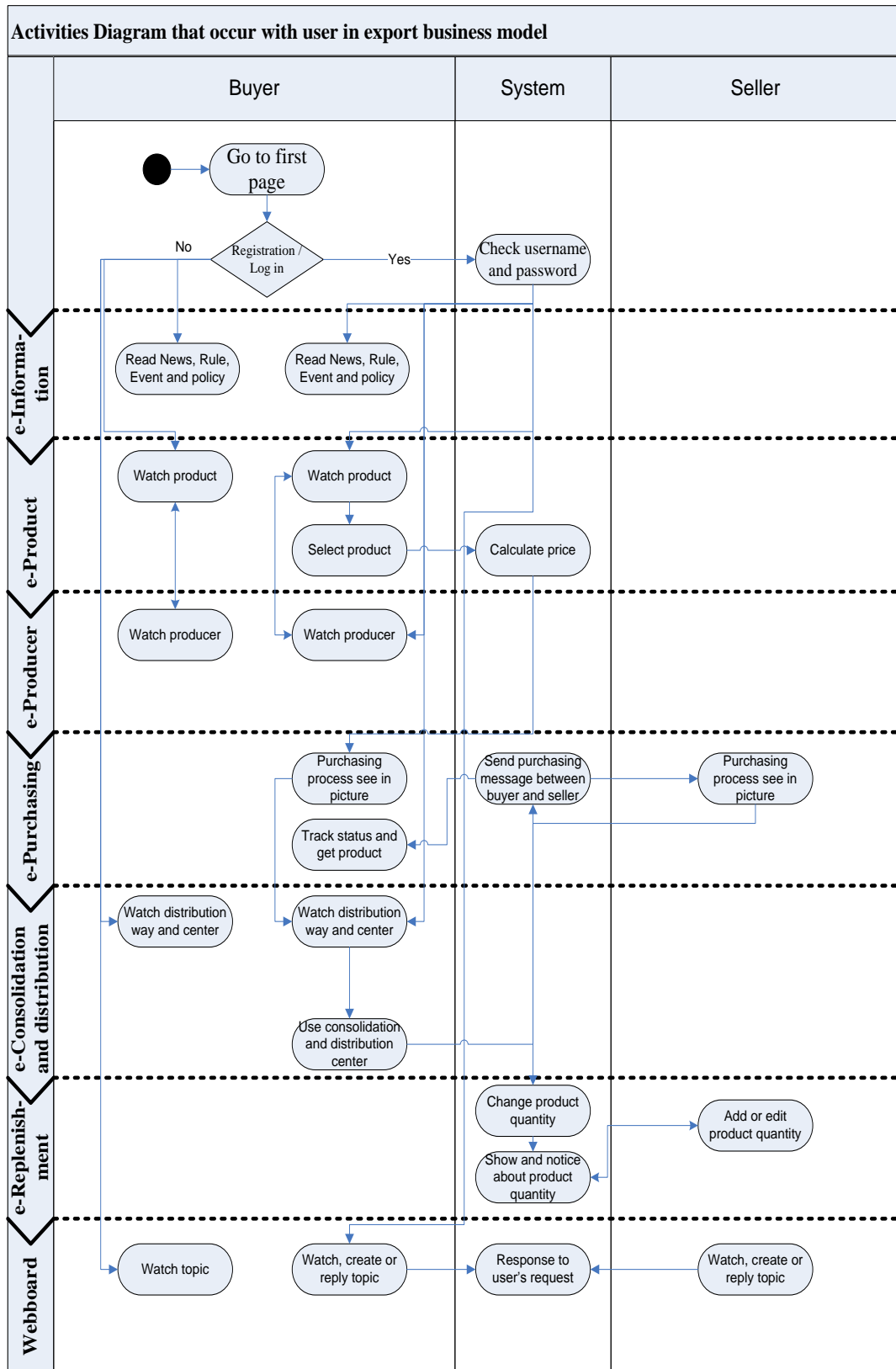


Figure 5.4 Activities Diagram that occur with user in export business model

5.1.4.2 Process model of seller in export business model

Workflow and step of seller OTOP products in export business model are shown as follows:

1. Users login to the OTOPDC website by registering as a new user for the first time, and signing in by filling username and password which was shown up previously, or not to login.

2. When a user chooses to login or register in the system, the system will record and check username and password if it is correct or not. If it is correct, the user will be allowed to login. If it is incorrect, the user can enter again, by a user login called register. When a new user finish filling in, the system will check the accuracy, and then allow users to sign in as a registered member. Username and password will be sent via e-mail automatically.

3. Seller's privilege in OTOPDC are shown as follows:

- 3.1 Can access to view information and regulations on e-Information.

- 3.2 Can add, edit, or delete their product information through e-Product.

- 3.3 Can add or edit their information such as location, products, name, etc.

- 3.4 When a seller received order, the buyer can make a reply via e-Purchasing system that will communicate via the client application, by using the RosettaNet messaging standards using PIP3A4 Purchase Order Request & Confirmation, PIP3C3 Notify of Invoice and PIP4C1 Distribute Inventory Report as shown in Figure 5.6, 5.9, and 5.11. Status can be changed while it is processing.

- 3.5 Seller can visit and use consolidation by browsing consolidation that interested and contact to join consolidation at the Register that announced to share consolidation together.

- 3.6 Seller can visit and comment in the webboard system.

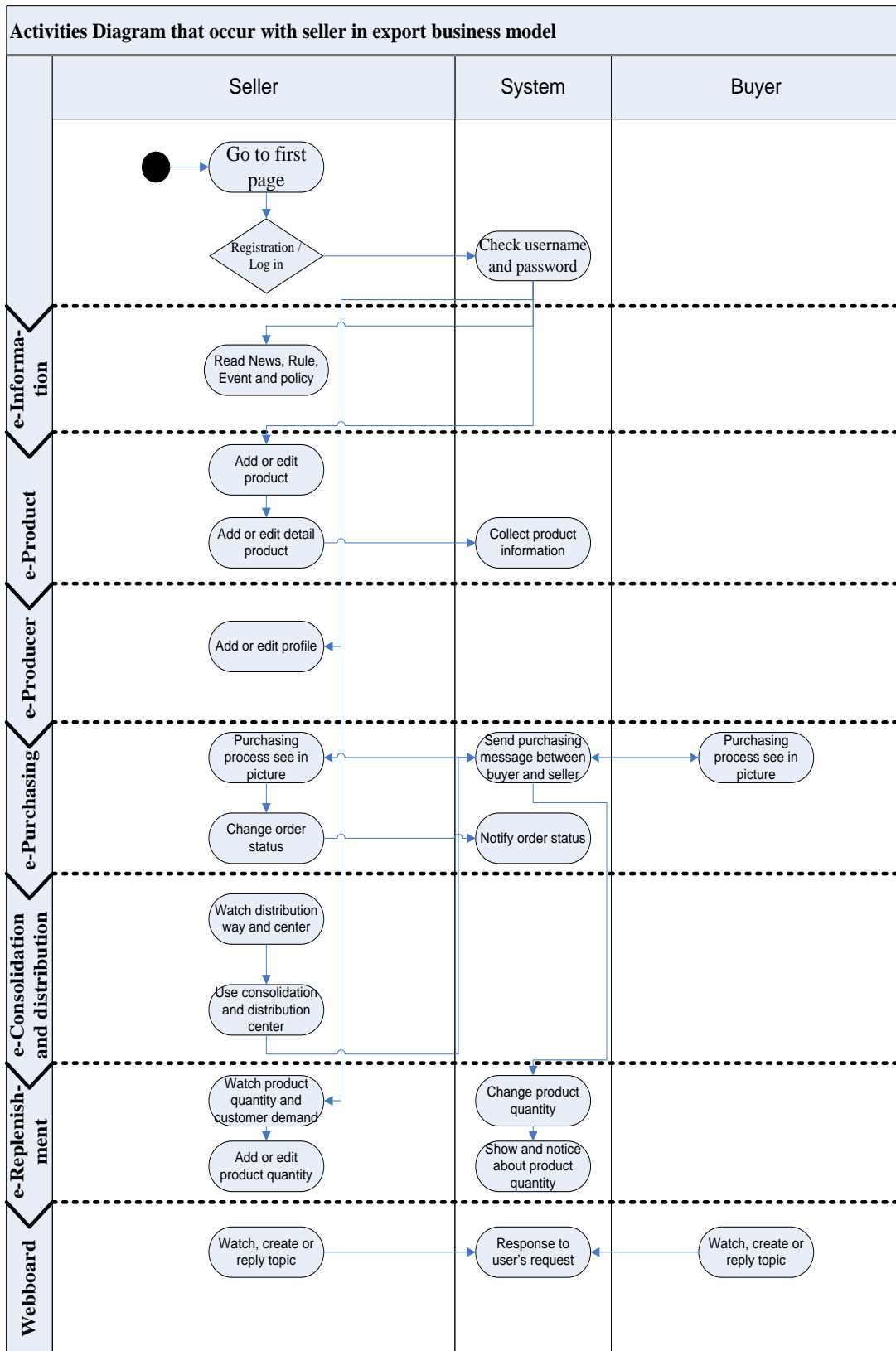


Figure 5.5 Activities Diagram that occur with seller in export business model

PIP3A4 Purchase Order Request & Confirmation

PIP3A4 document comprises a document sub-2 document are Purchase Order Request and Purchase Order Confirmation by the process of following orders:

1. The buyer creates purchase order and sends a message to the seller by using PIP3A4.
2. After the seller received a purchase order, then he/she would choose whether to sell or not. After that, the seller would send an acceptance order message to vendors. If the seller does not want to sell, he/she has to send a PIP3AJ message.

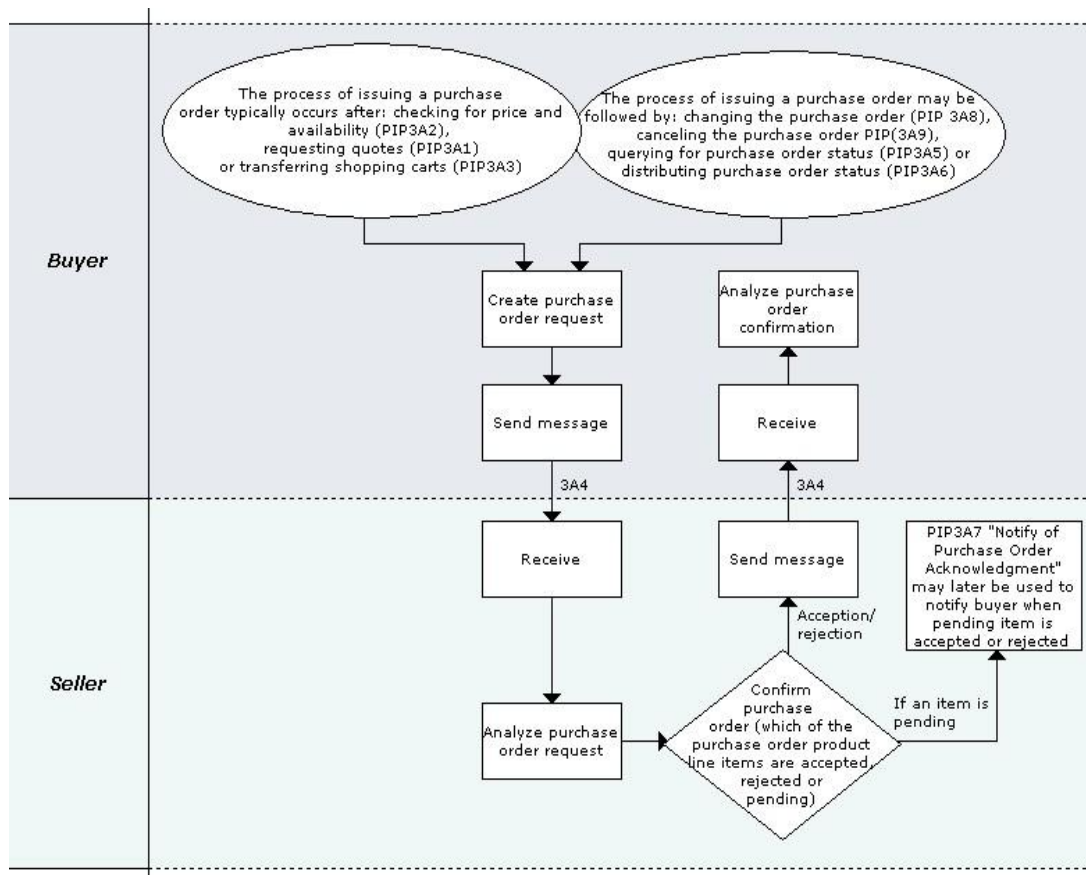


Figure 5.6 Process of PIP3A4

In the internal elements of the text in the image PIP3A4 and field of 5.7 documents PIP3A4 Purchase Order Request and Picture 5.8 field of document PIP3A4 Purchase Order Confirmation.

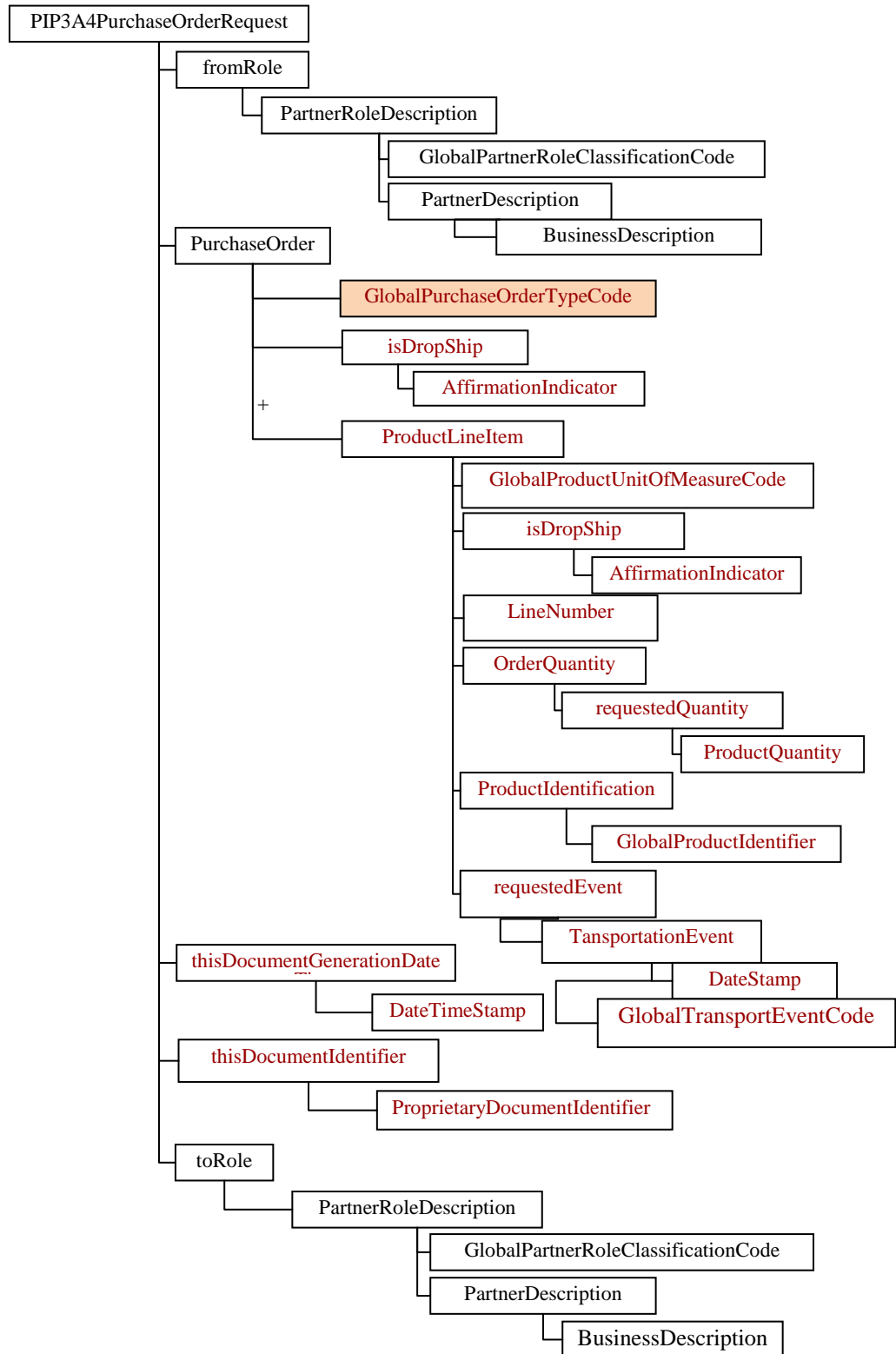


Figure 5.7 Filed of document PIP3A4 Purchase Order Request.

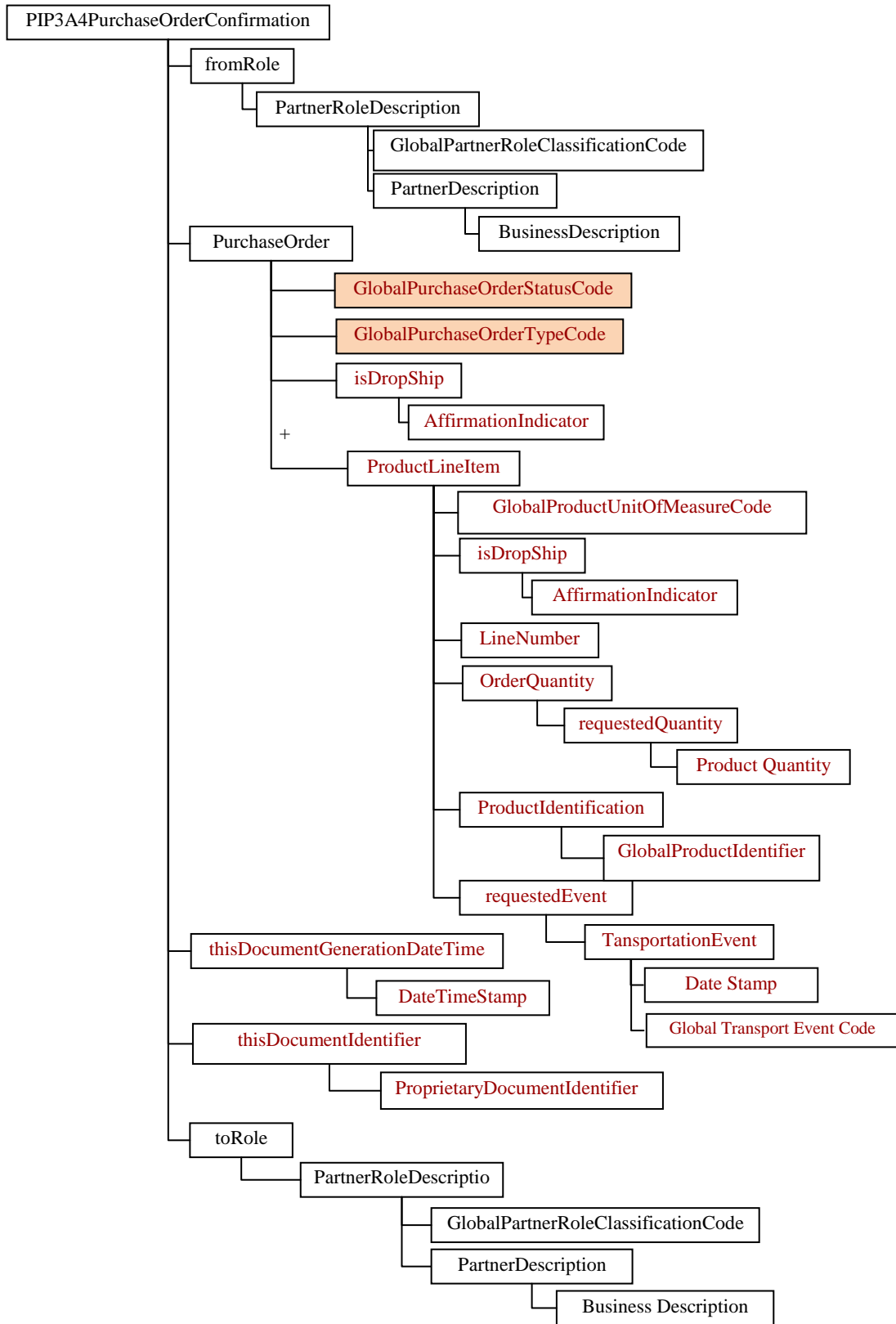


Figure 5.8 Filed of document PIP3A4 Purchase Order Confirmation.

PIP3C3 Notify of Invoice

PIP3C3 is a document used to bill from the seller to the buyer. The process of sending invoice is shown below by the internal components of PIP3C3 message as shown in the picture 5.10.

1. When buyers confirmed to purchase a product in PIP3A4, the seller would create PIP3C3 and send invoice to the buyer.
2. When buyer received an invoice and checked whether it is correct or not.

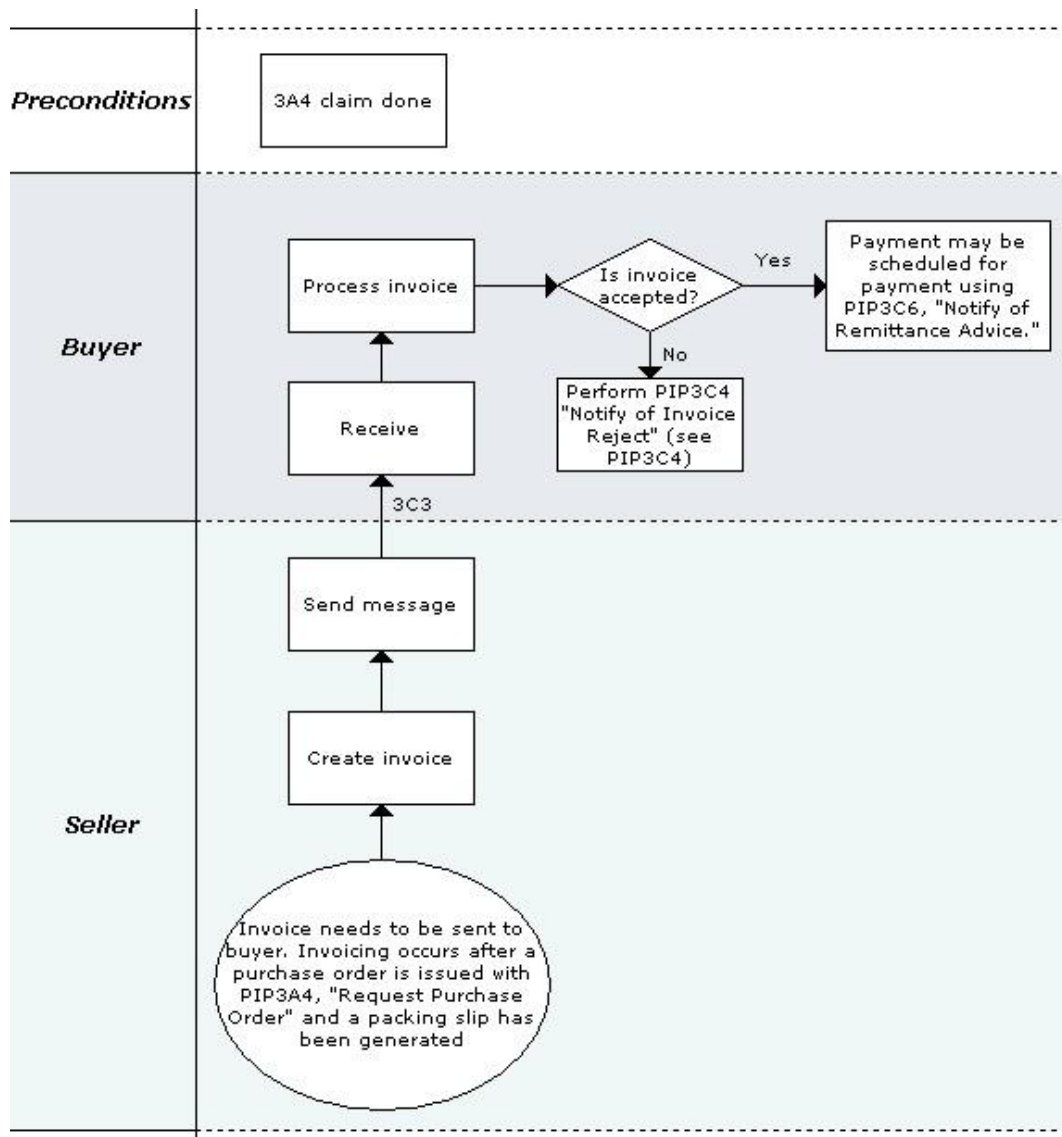


Figure 5.9 Process of PIP3C3

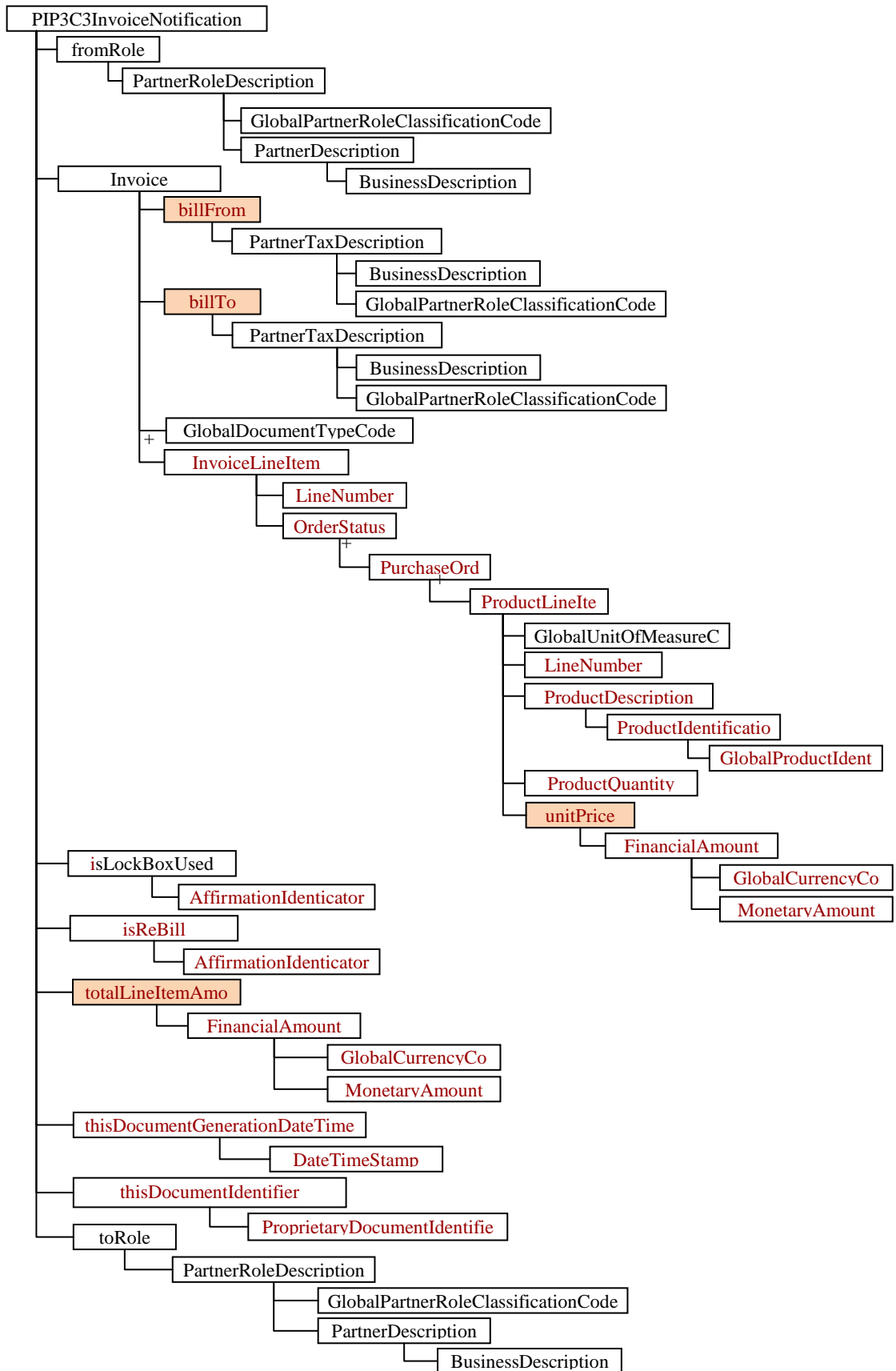


Figure 5.10 Filed of document PIP3C3 Invoice Notification

The design of user's privileges in each IT Function used to set permissions correctly, efficiency, and safety as follows:

1) e-Information

The privileges of user have been set for buyer, producer, trader and administrator who can access to information, but they cannot edit data or information. Only administrator can edit or delete information in the system. e-Information was created by synchronization of information from the Ministry of Commerce and Department of Foreign Trade website.

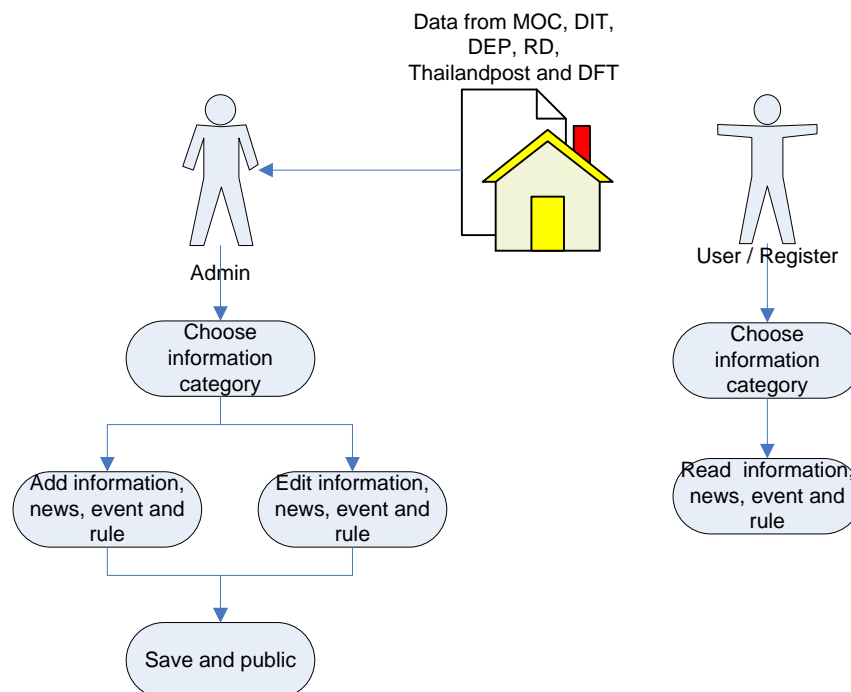


Figure 5.11 Privilege of e-Information

2) e-Producer

The privileges of user have been set for buyer, producer, trader and administrator who can access to information, but they cannot edit data or information. Only administrator and producer can edit or delete information in the system. e-Producer was created by synchronization of information from the Ministry of Commerce website and producers who have stores on the OTOPDC.

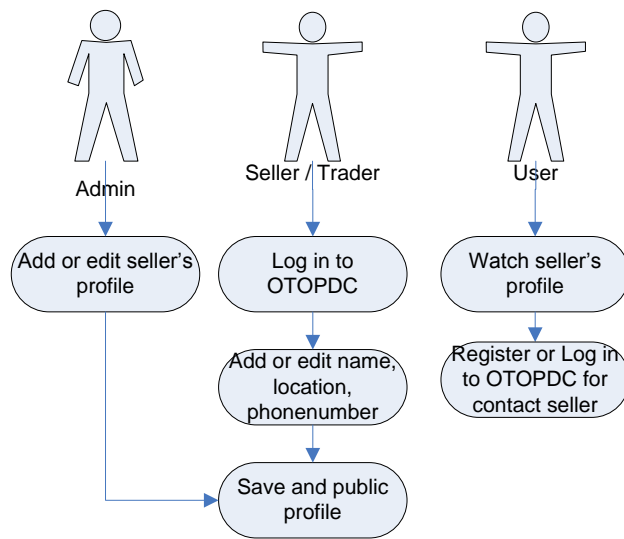


Figure 5.12 Privilege of e-Producer

3) e-Product

The privileges of user have been set for buyer, producer, trader and administrator who can access to information, but they cannot edit data or information. Only administrator and producer can edit or delete information in the system. e-Product was created by sellers who have stores on the OTOPDC and buyers who buy products from them.

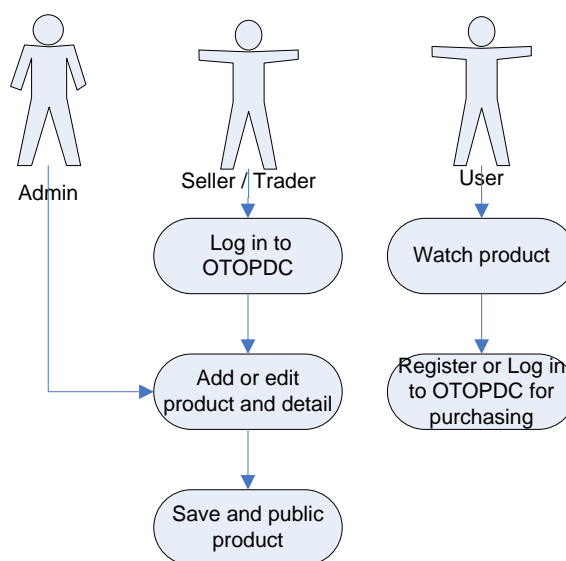


Figure 5.13 Privilege of e-Product

4) e-Replenishment

The privileges of user have been set for buyer, producer, trader and administrator who can access to information, but they cannot edit data or information. Only administrator and seller can edit or delete information in the system. e-Replenishment was created by the system that can inform purchase potential of buyers, and allow manufacturers to reduce or add amount of products.

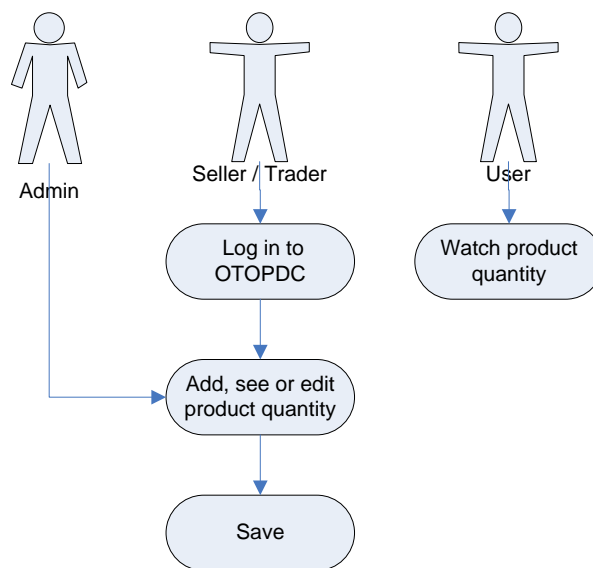


Figure 5.14 Privilege of e-Replenishment

5) e-Purchasing

The privileges of user have been set for buyer, producer, trader and administrator who can access to information and making information one by one cause. Only administrator can edit or delete any information in the system. e-Purchasing was created by buyers and sellers trade via OTOP Client application.

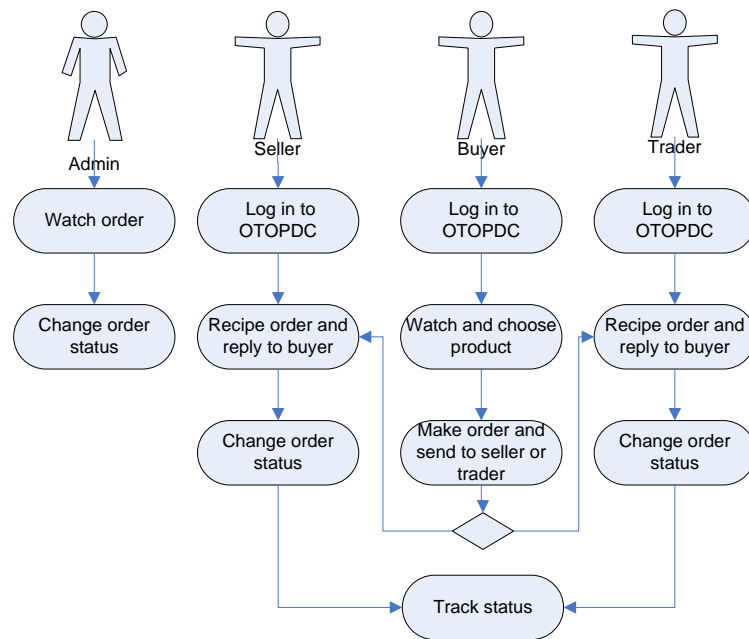


Figure 5.15 Privilege of e-Purchasing

6) e-Consolidation and distribution

The privileges of user have been set for buyer, producer, trader and administrator who can access to information. e-Consolidation and Distribution was created by synchronization of information from the Ministry of Commerce’s website, and transportation and distribution center of manufacturers.

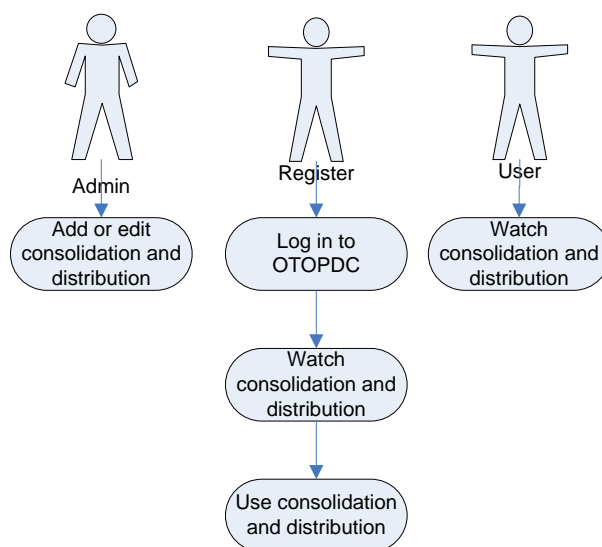


Figure 5.16 Privilege of e-Consolidation and distribution

7) Webboard

The privileges of user have been set for buyer, producer, trader and administrator who can access to information. Only administrator can edit or delete any information in the system. Webboard was created by buyer, producer, and trader who want to link with OTOP supply chain.

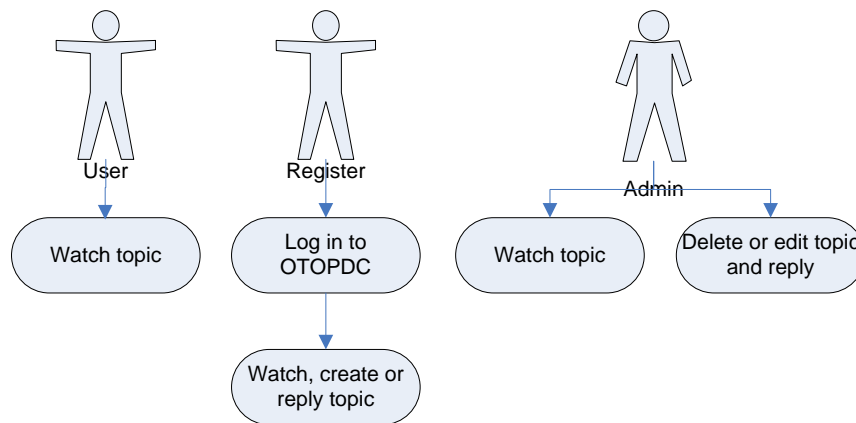


Figure 5.17 Privilege of Webboard

5.1.4.3 Process model of users in domestic business model

Workflow and step of seller OTOP products in domestic business model are shown as follows:

1. Users login to OTOPDC website by registering as a new user at the first time, and then filling username and password that was up previously or not to log in.
2. When a user chooses to login or register in the system, the system will record and verify username and password. If they are correct, it will allow you to login. If they are incorrect, you can try again. When a user logged in is called a register. When a new user finished filling in, the system will verify the information before allowing the user to sign in as a register. Username and password will be sent via e-mail.
3. In this process, a user has to be involved with 2 types of system – 1. Register, 2. User which has a privilege of the system on each type are shown as follows:

1.1 Register can access for viewing information and regulations on e-Information.

1.2 Register can visit to view and purchase products by the following process:

1.2.1 Select interested products to purchase.

1.2.2 Select payment method and type of transportation and view consolidation on e-Consolidation.

1.2.3 Distribution process will be completed when a purchased order is sent to the seller. It will be proceeded to communicate by using the HTML standard for e-Purchasing.

1.3 Register can select seller's information which can be searched by checking for product location and name of product sellers. Also, sellers' information can be linked to other products.

1.4 Register can purchase product in OTOPDC by selecting product in e-Product and choosing how to transport the product in e-Consolidation and distribution. After that, the register chooses whether to join the trade, choose how to pay, and then the system calculates for expense and sends the order to the seller. After the seller received the order, he would consider whether to sell the product or not. If he wants to sell, he would send an invoice to the buyer. If the seller does not want to sell, he would inform the buyer to cancel the order. The seller can show status of transporting the product all the time, so that the buyer would know the status of ordered product.

1.5 Register can visit and use consolidation by browsing consolidation that interested and contact to join consolidation at the Register announced to share consolidation together.

1.6 Register can see the number of products which is available in the system via e-Replenishment.

1.7 Register can visit and comment in the webboard system.

2.1 User can access to view information and regulations on e-Information.

2.2 User can access to view OTOP products.

2.3 User can access to view OTOP producer's information.

2.4 User can access to view and use e-Consolidation and distribution.

2.5 User can access to view topic and comment in webboard.

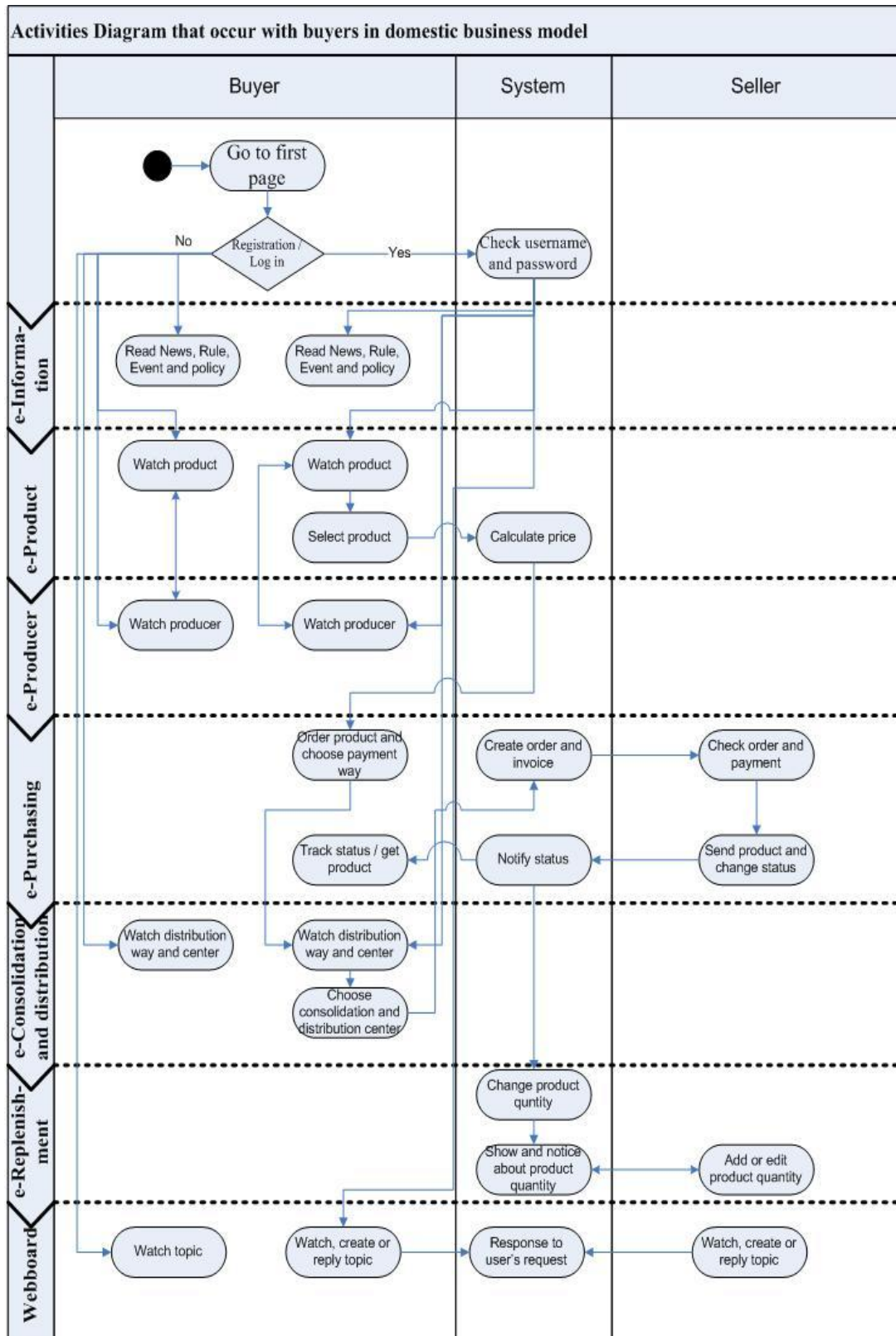


Figure 5.18 Activities Diagram that occur with user in domestic business model

5.1.4.4 Process model of seller in domestic business model

Workflow and step of seller OTOP products in domestic business model are shown as follows:

1. Users login to the OTPDC website by registering as a new user for the first time, and signing in by filling username and password which was shown up previously, or not to login.

2. When a user chooses to login or register in the system, the system will record and check username and password if it is correct or not. If it is correct, the user will be allowed to login. If it is incorrect, the user can enter again, by a user login called register. When a new user finish filling in, the system will check the accuracy, and then allow users to sign in as a registered member. Username and password will be sent via e-mail automatically.

3. Seller's privilege in OTPDC are shown as follows:

- 3.1 Can access to view information and regulations on e-Information.

- 3.2 Can add, edit, or delete their product information through e-Product.

- 3.3 Can add or edit their information such as location, products, name, etc.

- 3.4 When a seller received order, the buyer can make a reply via e-Purchasing system that will communicate via the website of OTPDC, by using the HTML messaging standards.

4. Seller can visit and use consolidation by browsing consolidation that interested and contact to join consolidation at the Register that announced to share consolidation together.

5. Seller can visit and comment in the webboard system.

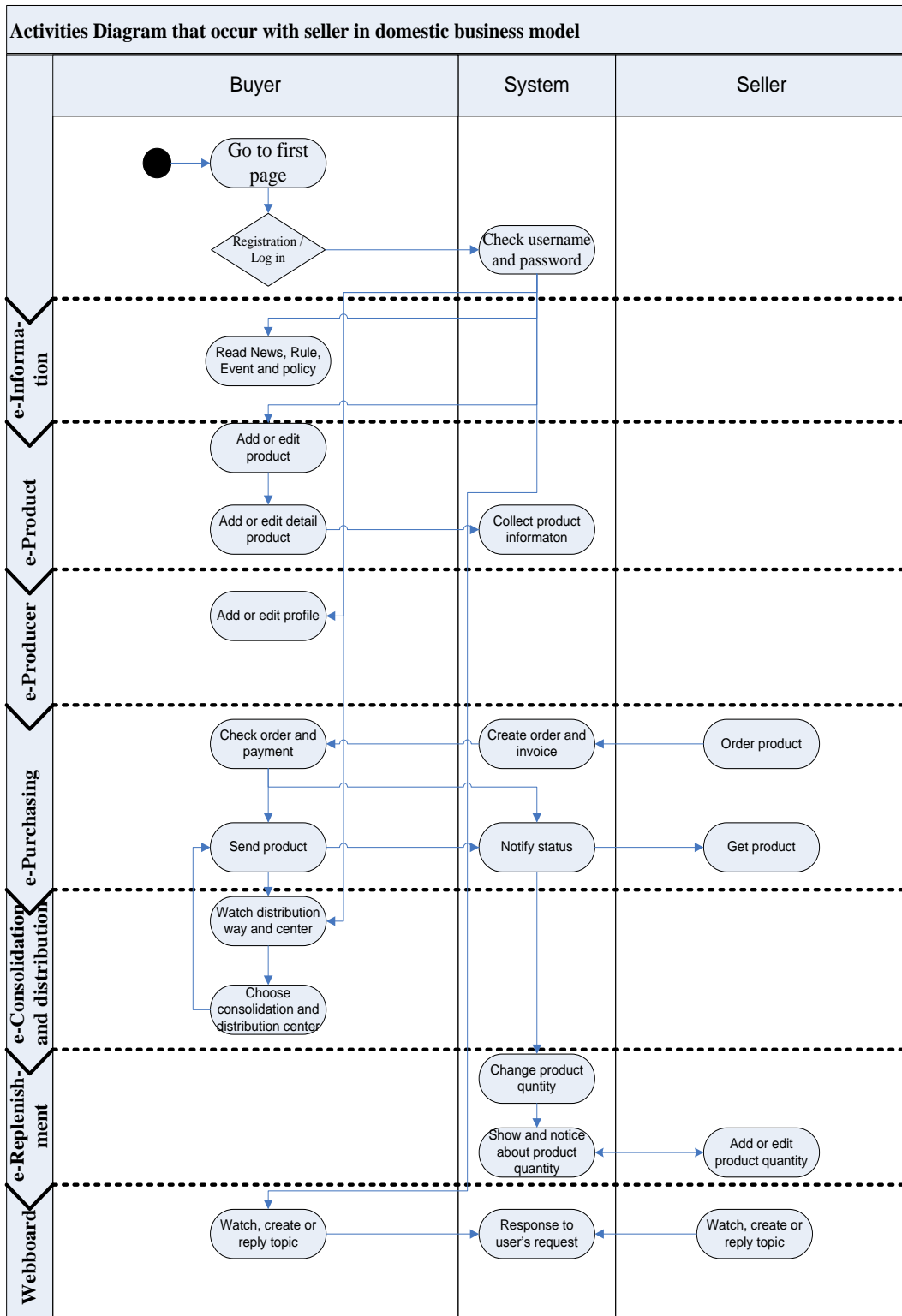


Figure 5.19 Activities Diagram that occur with seller in domestic business model

The design of user's privileges in each IT Function used to set permissions correctly, efficiency, and safety as follows:

1) e-Information

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information, but they cannot edit data or information. Only administrator can edit or delete information in the system. e-Information was created by synchronization of information from the Ministry of Commerce, Department of Foreign Trade website, The Revenue Department, and Thailand Post.

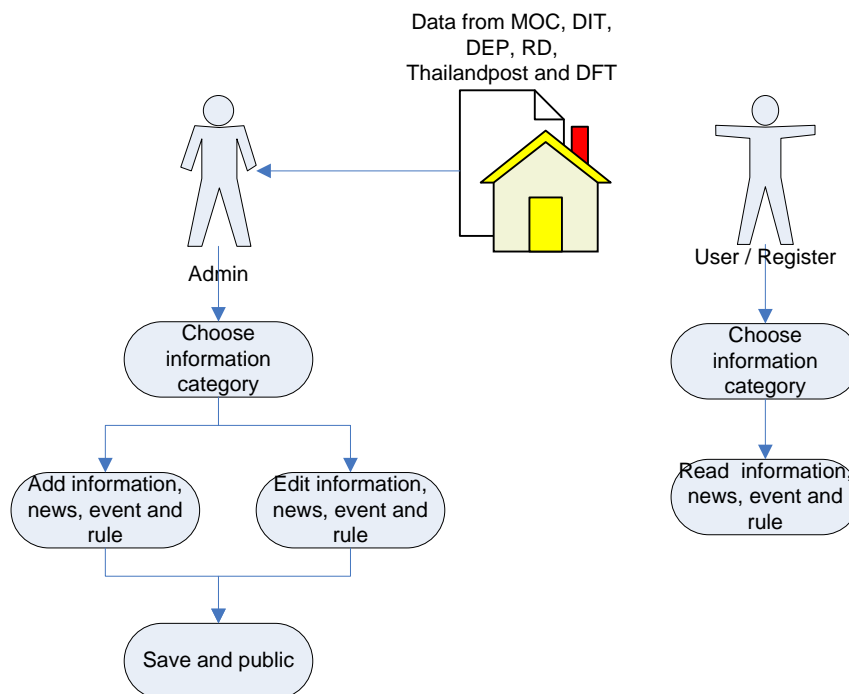


Figure 5.20 Privilege e-Information

2) e-Producer

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information, but they cannot edit data or information. Only administrator and producer can edit or delete information in the system. e-Producer was created by synchronization of information from the Ministry of Commerce website and producers who have stores on the OTOPDC.

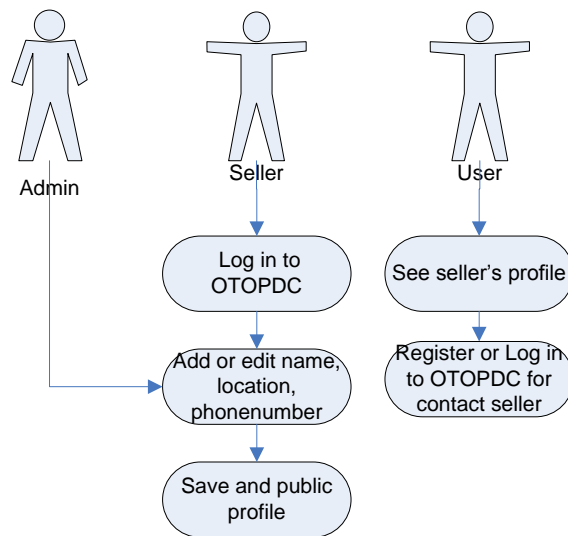


Figure 5.21 Privilege of e-Producer

3) e-Product

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information, but they cannot edit data or information. Only administrator and producer can edit or delete information in the system. e-Product was created by sellers who have stores on the OTOPDC and buyers who buy products from them.

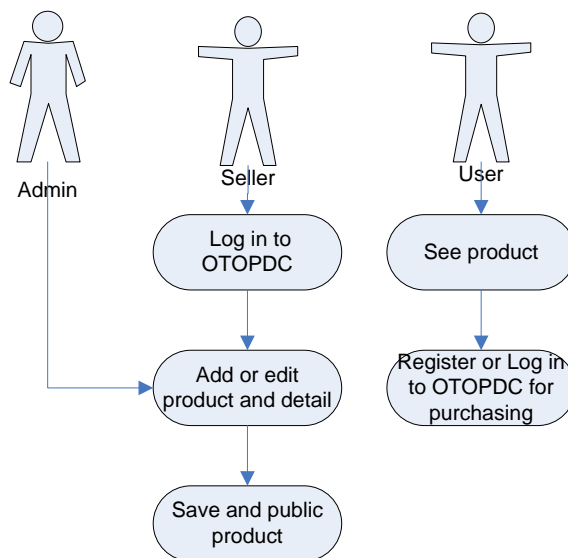


Figure 5.22 Privilege of e-Producer

4) e-Replenishment

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information, but they cannot edit data or information. Only administrator and seller can edit or delete information in the system. e-Replenishment was created by the system that can inform purchase potential of buyers, and allow manufacturers to reduce or add amount of products.

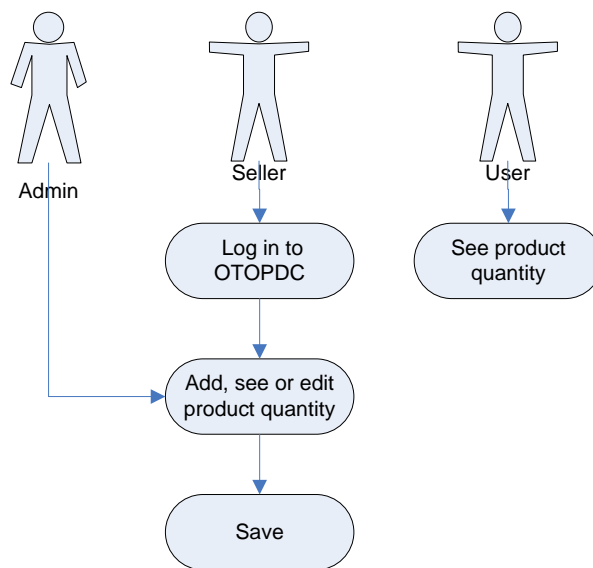


Figure 5.23 Privilege of e-Replenishment

5) e-Purchasing

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information and making information one by one cause. Only administrator can edit or delete any information in the system. e-Purchasing was created by buyers and sellers trade via OTOPDC.

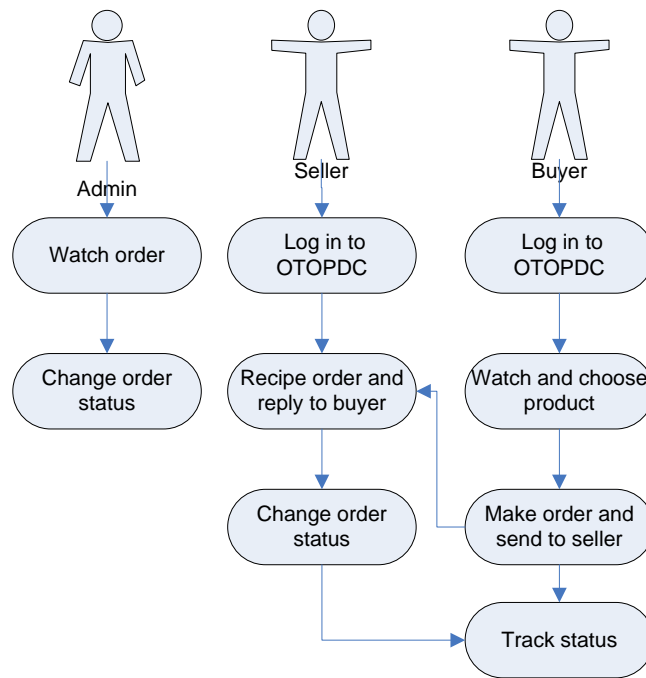


Figure 5.24 Privilege of e-Purchasing

6) e-Consolidation and distribution

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information. e-Consolidation and Distribution was created by synchronization of information from the Ministry of Commerce’s website, and transportation and distribution center of manufacturers.

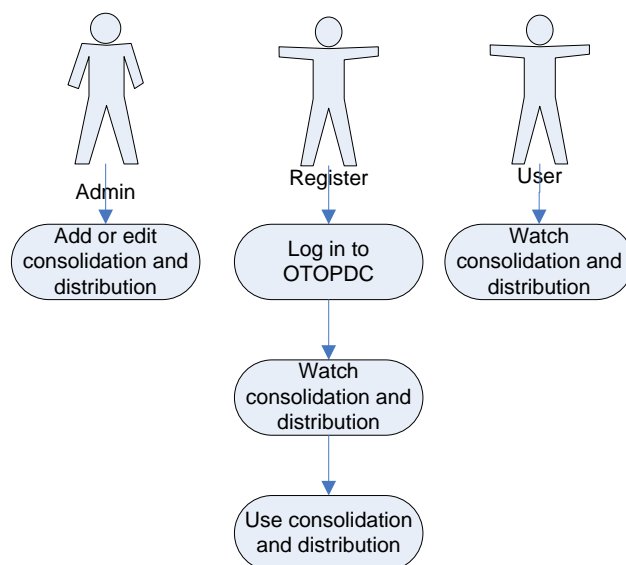


Figure 5.25 Privilege of e-Consolidation and distribution

7) Webboard

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information. Only administrator can edit or delete any information in the system. Webboard was created by buyer, producer, and trader who want to link with OTOP supply chain.

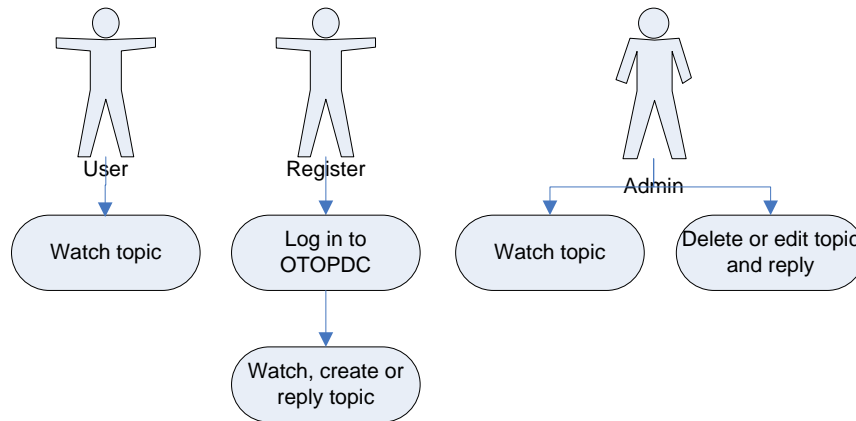


Figure 5.26 Privilege of Webboard

5.1.4.5 Process model of user in district business model

Workflow and step for OTOP products seller in export business model are shown as follows:

1. Users login to the OTOPDC website by registering as a new user for the first time, and signing in by filling username and password which was shown up previously, or not to login.
2. When a user chooses to login or register in the system, the system will record and check username and password if it is correct or not. If it is correct, the user will be allowed to login. If it is incorrect, the user can enter again, by a user login called register. When a new user finish filling in, the system will check the accuracy, and then allow users to sign in as a registered member. Username and password will be sent via e-mail automatically.
3. In this process, a user has to be involved with 2 types of system – 1. Register 2. User which has a privilege of the system on each type are shown as follows:

1.1 Register can access to view information and regulations on e-Information.

1.2 Register can visit and use consolidation by browsing consolidation that interested and contact to join consolidation at the Register, and announce to share consolidation together.

1.3 Register can visit and comment in the webboard system.

2.1 User can access to view information and regulations on e-Information.

2.2 User can access to view and use e-Consolidation and distribution.

2.3 User can access to view topic and comment in webboard.

created by synchronization of information from the Ministry of Commerce, Department of Foreign Trade website, The Revenue Department, and Thailand Post.

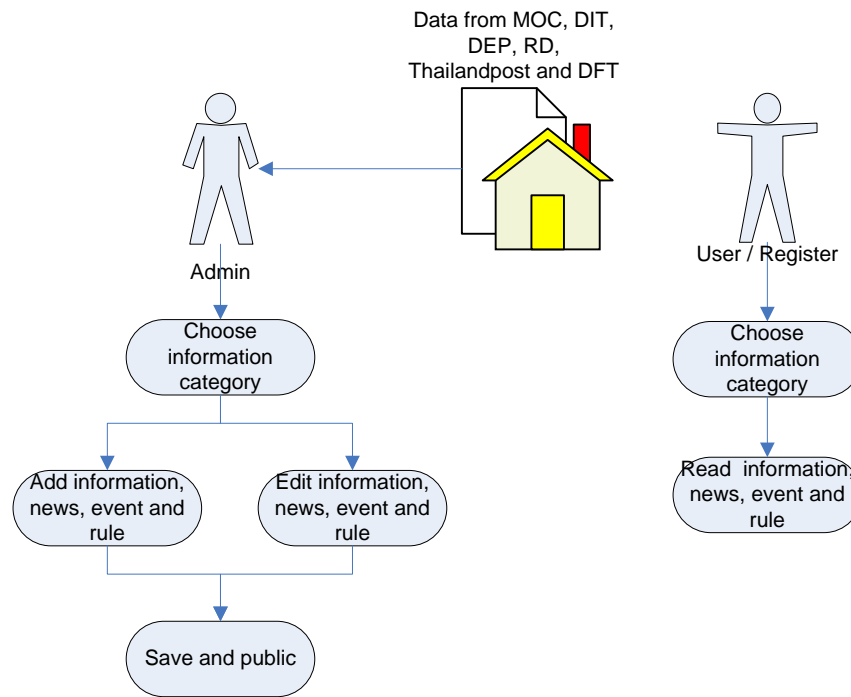


Figure 5.28 Privilege of e-Information

2) e-Consolidation and distribution

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information. e-Consolidation and Distribution was created by synchronization of information from the Ministry of Commerce’s website, and transportation and distribution center of manufacturers.

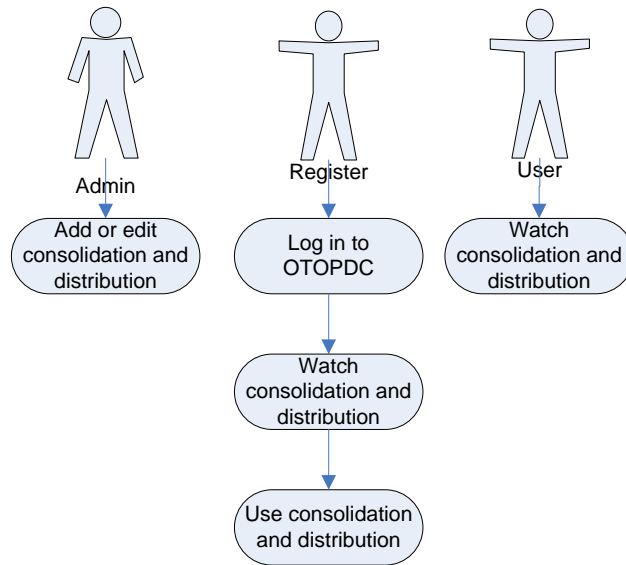


Figure 5.29 Privilege of e-Consolidation and distribution

3) Webboard

The privileges of user have been set for buyer, producer, trader, and administrator who can access to information. Only administrator can edit or delete any information in the system. Webboard was created by buyer, producer, and trader who want to link with OTOP supply chain.

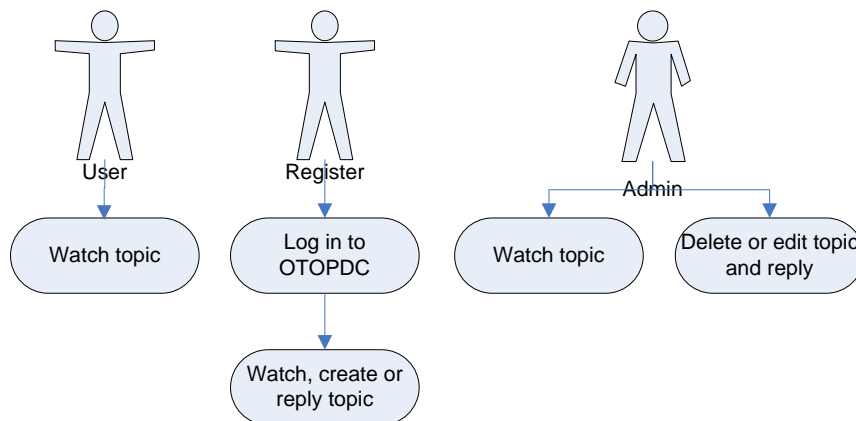


Figure 5.30 Privilege of Webboard

5.2 Evaluation

The researchers had developed IT Functions for requirement from users in any levels as discussed above. However, developers and administrators (Host) have to monitor and evaluate in this section. Thus, when the researcher had done with designing OTOPDC system, the developer and administrator (Thailandpost) have to verify and check this system for capability, efficiency, and appropriateness. There are 2 parts of evaluation as follows:

5.2.1 Evaluation of IT Functions and architectures

The first part is evaluation of IT Functions and architectures in each business model.

5.2.1.1 Evaluation of IT Functions and architectures for export business model. IT Functions and architectures that the researcher designed are appropriate and sufficient to create OTOPDC system, and can be used practically, because the IT Functions have been designed for requirement of the users. However, the design needs to be considered for collection of operators and users. Therefore, this OTOPDC system would be successful. Furthermore, User Interface (UI) has to be easy and appropriate for all users, and developers of this system.

5.2.1.2 Evaluation of IT Functions and architectures for domestic business model

IT Functions and architectures that the research designed are appropriate and sufficient to develop OTOPDC system, and can be used practically, because the IT Functions had been designed for requirements of the users. However, financial transaction management should be maintained in high security, and should have symbols that indicate financial transactions in each time for safety.

5.2.1.3 Evaluation of IT Functions and architectures for district business model

IT Functions and architectures that the research designed are appropriate and sufficient to create OTOPDC system, and can be used practically, because the IT Functions had been designed for requirements of the users. However, it

should have knowledge for community as well, so that the users can learn and understand functions of the system.

5.2.2 Evaluation of OTOP Distribution Center factors

Evaluation in Hardware, Software and Services by Jame A. O'Brien and George M. Marakas in Enterprise Information Systems book Thirteenth Edition provides details for following evaluation.

The researcher had designed Evaluation of OTOP Distribution Center factors which is suitable for IT Functions host as shown in Table 3.2

5.2.2.1 Evaluation of OTOP Distribution Center factors for export business model

Evaluation of this business model for IT Solution by the Host was concluded that it is qualify and very suitable for investment. Scalability has to meet the needs of administrators. It has flexibility for adjusting with high change that covers all needs. The Host estimated that the hardware should be replaced with a new one, because it is ineffective and inappropriate for OTOPDC. The Host was satisfied with the cost, so that it is reasonable to invest on hardware, developer, and operator.

5.2.2.2 Evaluation of OTOP Distribution Center factors for domestic business model

Evaluation of this business model for IT Solution by the Host was concluded that IT Solution scalability is suitable administrators. It has flexibility for adjusting with high change that covers all needs. Technology is fit and suitable for investment and development. Its quality can attract demand of people who will come to use. Hardware has already been invested, and has high satisfactory. IT Solution does not require investment because most of the Host is capable to use it.

5.2.2.3 Evaluation of OTOP Distribution Center factors for district business model

Evaluation of this business model for IT Solution by the Host was concluded that IT Solution scalability is suitable for administrators. Flexibility is

so high, because it can be modified easily for any needs. Technology is fit and suitable for investment and development. Its quality can attract demand of people who will come to use. Hardware has already been invested, and has high satisfactory. IT Solution does not require investment because most of the Host is capable to use it.

CHAPTER VI

DISCUSSION

6.1 Data collection and problem analysis

According to the study and interview with 12 OTOP manufacturers in 6 provinces, business management problems were found. After that, the problems and business models of each manufacturer were analyzed. The problems which have already presented were collected and analyzed. Such problems can be solved by using information technology system. Creating OTOP Distribution Center and using IT Functions can be discussed in the following topics:

1) e-Producer is information of OTOP manufacturers or traders which is shown by name, location, history, and product. It can be searched for manufacturer's information by name or geographical location in region, province, and Tambon. Normally, e-marketplace on website has IT functions which are very useful for buyers and sellers, because it helps them to know traders' information, and to contact and find them easily. So this function in Export and Domestic will be high priority for develop OTPDC. However, OTOP websites have less or none of IT functions, so that sellers and buyers contact each other difficultly. On the other hand, if they want to use the IT functions, they have to update their information all the time. Moreover, when they use the functions, the system controller has to check registered traders if they really exist.

2) e-Product shows details and prices of OTOP. It can be searched by category of product or OTOP name. They are categorized as food, beverage, clothes/costumes, commodities/decorations/souvenirs, and herb. This IT function can help manufacturers show their products to buyers or viewers. So this function in Export and Domestic will be high priority for develop OTPDC. Although OTOP websites have this information, they were filled by webmasters that some of them are incorrect or out of date, so that the buyers receive incorrect and incomplete

information. Also, if OTOP manufacturers or traders want to use this IT function, they have to update their information all the time and system controllers have to check the products that traders post all the time for correction.

3) e-Information shows news and announcement about OTOP, and other news such as OTOP expo, information, academic journals, etc. Therefore, buyers, manufacturers, sellers, and anyone who interested know updated and corrected information and news, because they receive information from direct agencies. However, they have to receive cooperation from responsible and related agency, in order to get the highest benefit from the IT function.

4) Webboard for idea exchange among manufacturers, traders, and customers. On the webboard, they can publish information, announcement, or question each other. In this IT function, administrator or host has to pay special attention to incorrect or irrelevant information about OTOP such as advertisements from spammers or messages from troublemakers.

5) e-Replenishment is a system for stock management of a shop. It can tell traders how much product left in the stock. However, the traders have to make sure that the numbers they put in are correct, otherwise, they do not have enough products for buyers.

6) e-Purchasing can make purchase order, acknowledgement, and receipt. This IT function on the website can reduce numbers of documents and make ordering products easier. So this function in Export and Domestic will be high priority for develop OTPDC However, buyers and sellers have to learn and understand its procedures before doing the online business. In the part of paying, there are many easy ways such as e-banking, paypal, paysbuy, true money, etc. Nevertheless, the function needs a high quality of security system as well.

7) e-Consolidation and Distribution is a system for transportation and distribution management. It let buyers to choose how they want sellers to deliver products. However, to get efficiency from this IT function, it needs cooperation from everyone such as a host who take care of transportation, and buyers and sellers who want to trade with each other. Therefore, the administrator has to pay special attention to the IT function.

6.2 Comparison of OTOP website and Enterprise resource planning

Nowadays there are many websites about OTOP such as Thaitumbon.com, www.otop5star.com, www.otopportal.com, etc. Therefore, the researcher had compared functions on these websites with IT Functions that buyers and sellers want to use. Also, the researcher had brought Microsoft Dynamics AX which is popular in the present to compare with.

Table 6.1 Comparison of OTOP website and Enterprise resource planning

Function	OTOPDC	AX	thaitumbon.com	otop5star.com	otopportal.com
Producer	X	X	X	X	X
Product	X	X	X	X	X
Information	X		X	X	X
Replenishment	X	X			
Purchasing	X	X			
Consolidation and distribution	X	X			
Webboard	X				
Map and Travel Information			X		
CRM	X	X			

According to the table, obviously that each website has different capability. However, there is only OTOPDC that covers most of OTOP buyers-sellers' demand. Some IT Functions on OTOP websites nowadays are not good enough for usage. For example, their information are out of date, incorrect, and do not categorize. Therefore, OTOPDC should be developed for real usage, because it was designed to solve such problems. In addition, AX which is Enterprise Resource Planning (ERP) is not suitable for investment, because it needs a great deal of budget. And ERP which is freeware is too difficult to use and does not cover all of OTOP buyer-seller's work.

6.3 System design

The researcher had categorized Infrastructure of OTOPDC into 2 major categories – 1. Contents Management System and 2. Transaction Management, so as to make it is easier for management and seeing the whole view of the system. Infrastructure of OTOPDC is categorized to be suitable for business model as follows:

1. Architecture of export business model has used RosettaNet standard which is very popular for sending information between buyers and sellers in Transaction Management. RosettaNet standard has been designed for business-to-business in large supply chains. There is a great deal of business communication, business process that covers all business-to-business and also higher technology and reduce cost than EDI that popular in the past. However, RosettaNet standard is not quite popular in Thailand so that hard to develop and understand in standard. If not switch to another standard that better suite than RosettaNet, Ministry of Information and Communication Technology which expert in this standard have to share the knowledge and the push this system up. Contents Management uses HTML standard, because it shows complete contents and information, and easily to be accessed. Today, HTML is popular as identifier and information exchanger. Hardware and network connection that used are supported and acknowledged how to use by Ministry of Information and Communication Technology, so as to make sending and receiving information between buyers and sellers be correct and efficient. The online payments involve communication have to use trusted third party (TTP) during payment and in general they are considered as more secure than online payments that involve only the payer and the payee. [21]

2. Architecture of domestic business model has used HTML standard which is very popular today as identifier and exchange information of Contents Management System and Transaction Management, because the standard is not too complicated, and anyone who usually surfs the internet would be familiar and understand its function well. Also, it is easily to be accessed that does not need application like export business model, so that Infrastructure of OTOPDC in domestic business model can be used at the same place. Although HTML is very popular, it has many flaws that some people try to hack, steal, and destroy the information. If it is developed for real usage, a system controller have to check security system in each IT function, and users have to learn how to use function of OTOPDC thoroughly, in order to use it efficiently as users and the researcher has expected.

3. Architecture of district business model has used HTML standard which is popular today as identifier and information exchanger in Contents Management System by using some IT Functions which is suitable for OTOPDC users in this business model, in order to let them access OTOPDC easily. However, after collecting data from the users, it was found that using information technology with users in this level is too difficult, because they hardly ever buy materials which are far away from source of production, have little of purchasing power, and have little IT knowledge. Therefore, OTOPDC manufacturers in this business model need advice and training, in order to use OTOPDC in this business model efficiently as the researcher has expected.

6.4 Evaluation

The evaluation from Thailand Post (Host) that had evaluated the design of OTOPDC has two parts. The evaluation can be explained as follows:

6.4.1 Evaluation of IT Functions and architectures

According to the evaluation from the host, obviously that IT Functions and architectures of OTOPDC are very suitable, because they were created by buyer-seller's needs. The host agreed that they are suitable. However, it was found that the study has some disadvantages as follows:

- Information has a good security system, because there is a great deal of important information. Normally, e-business in Thailand has a bad image, because the security system is not good enough, so that people are afraid to do it. Therefore, this system needs experts to design and develop OTOPDC.
- In order to design User Interface (UI), it needs a model which is easy to use, because, basically, the users do not know about OTOPDC before. Therefore, it is very important that the UI has to be easy to understand and use.
- Designers or related agencies have to develop knowledge of how to use OTOPDC, so as to let buyers or sellers to learn and use OTOPDC correctly.

6.4.2 Evaluation of OTOP Distribution center factors

According to the evaluation from the host, it was concluded that investment of OTOPDC for export is very suitable, and it can be developed for real usage. However, the host still worries that they might be difficult to find anyone who can develop the technology, and it needs a great deal of expense. Therefore, NECTEC and Ministry of Information and Communication Technology have to give assistance, because the standard is suitable and efficient, and many countries use it nowadays. However, if there are new standard in the future which is better and more suitable than RosettNet, they should use it, because of proficiency, system development, and investment. Nevertheless, if they receive cooperation from the mentioned agencies, the researcher and the evaluator figure that such problems would be solved.

The host concluded that investment of OTOPDC for domestic and local business is very suitable, because the technology is not too expensive, has hardware and developers. Moreover, software package in the present is suitable. It only needs the design of IT Functions and architecture for development. If they want to use OTOPDC for real, they should use it in domestic and local business first, because they are Solutions that can solve problems and can be used for real. However, before developing OTOPDC for real usage, they should discuss with the users which are buyers, sellers, and related people, again, in order to get understand and use the technology according to the system of Solution.

6.5 Limitations

- It needs a full cooperation from everyone, in order to get the system to the goal and be successful.
- The system is not designated to be developed by what kind of computer, so that the developer has to choose the most suitable one.
- The system has no specific efficiency for collecting data, so that the developer should evaluate the data before developing for real user.

CHAPTER VII

CONCLUSION AND RECOMMENDATION

7.1 Conclusion

Data collected from the study and the survey of 12 OTOP manufacturers in 6 provinces has shown business problems. After that, problems and business model of each manufacturer had been analyzed. It was found that they lack of connection between supply and demand. In other word, the manufacturers produce products which are not match with customers' needs. Also, sometimes the customers could not get the same product, because there is no shop for selling the products which is a lost of channel for product distribution. Although nowadays each province receive budget from the government to organize product distribution center, most of them still has some problems. Most traders lack of marketing strategy. They pay attention at their production only. Support from the government is unclear. Support for manufacturers is not considered by market's demand or it does not match with consumer's needs. It also lack of direction and a clear plan for support, and lack of full support, consistency, and applying with each other. As a result, support or standard of many agencies are redundant. Evaluations from the government are redundant or have only one aspect that affects government agencies. It also lack of tool for evaluating logistic capability of OTOP traders. Moreover, using "star" as a symbol of product level does not reflect market level. Also, there is no agency for collecting necessary information about OTOP, in order to use as database of government sector and use for business channel analysis

Therefore, the researcher gave suggestion for increasing logistic and supply chain capabilities of OTOP by designing business model. This research has presented business model for manufacturers in 3 levels – export, domestic, and local – as guidelines for them to apply with their business. The researcher also designed IT Function named OTOP Distribution Center (OTOPDC) as OTOP distribution channel,

and connects production sector and marketing between demand and supply together. OTOPDC was designed and developed for logistic system in the part of buying-selling products and materials of export, domestic, and local traders. The problems, IT Functions, and solutions in each level, are shown in the following table 7.1.

Table 7.1 The problems, IT Functions, and solutions

Problem	IT Function	Export	Domestic	Local	Solution
<ul style="list-style-type: none"> - No information of date, time, and place of OTOP expo update. - No shown standard, rule, regulation, and expense for exporting products to other countries. 	e-Information	X	X	X	<ul style="list-style-type: none"> - Update news and announcement from direct agencies all the time. - Connect with related websites. - Register to get news and information via e-mail.
<ul style="list-style-type: none"> - Products are not enough for selling in souvenir shops, expos, etc. 	e-Replenishment	X	X		<ul style="list-style-type: none"> - Design a system that shows numbers of products in the stock. - Show statistics of selling, so as to know demand of each product.
<ul style="list-style-type: none"> - Cannot purchase products from websites. 	e-Purchasing	X	X		<ul style="list-style-type: none"> - Design a system for purchasing on a website by using RosettNet standard with export level, and HTML standard with domestic level.

Table 7.1 The problems, IT Functions, and solutions (cont.)

Problem	IT Function	Export	Domestic	Local	Solution
	e-Purchasing	X	X		<p>- 24-hour purchasing with an official to watch all the time.</p> <p>- Design a system for domestic level to be able to pay by many channels for collecting purchasing data.</p> <p>- Design a system for domestic level to be able to pay by many channels.</p>
<p>- There is no center for receiving, sending, and distributing products and materials.</p> <p>- Transportation channels for products and materials are not enough.</p>	<p>e-Consolidation</p> <p>e-Distribution</p>	X	X	X	<p>- Design a system for transportation, product distribution, and purchasing materials or products.</p> <p>- Connect buyers and sellers together for transportation, product distribution, and purchasing materials or products.</p>

Table 7.1 The problems, IT Functions, and solutions (cont.)

Problem	IT Function	Export	Domestic	Local	Solution
					- Present transportation route from buyers, sellers, transportation companies, and Thailand Post.
- Manufacturers do not know where their market and trader for their product are.	e-Producer e-Product	X	X		- Design a center for purchasing, product distribution, and OTOP manufacturers.
-Traders do not know who manufacture products that the market wants.	e-Producer e-Product	X	X		- Design a presentation for OTOP manufacturer's information by name, location, history, and product. - Design a system that can be searched for manufacturer's information by name, product, or geographical location. - Connect product and manufacturer together. - Design a system that manufacturer can show and correct detail, picture, and price of OTOP in each category.

Table 7.1 The problems, IT Functions, and solutions (cont.)

Problem	IT Function	Export	Domestic	Local	Solution
- Lack of communication and idea exchange.	Webboard	X	X	X	- Design a system that has communication and idea exchange between buyers and sellers on the internet.

According to the table7.1, the researcher had presented problems and designed IT Functions to solve such problems that happened to buyers and sellers in the present. The buyers and sellers gave opinions that if OTOPDC are developed for real usage, the problems would be solved. The IT Functions which had been designed are suitable for all business models. It can be shown and concluded as follows:

IT Function that export business model uses to solve the problems is e-Information. If it receives full cooperation from related agencies and persons, it would be a good channel for news announcement. E-Replenishment is a useful IT Function for purchasers. However, if the purchasers do not update their products in the stock all the time, they would not get any benefit from the IT Function. E-Purchasing uses RosettaNet to send and receive information, because it is very suitable for the business model. However, this standard is not quite popular, so that users and developers have to learn and study more about it. E-Consolidation and Distribution is an IT Function that has the greatest problem, because assembling to purchase product is difficult. However, if buyers and sellers join into a group and help each other, this IT Function would reduce transportation expense and has a channel for transportation. E-Producer, e-Product, and Webboard should be created first, because they would let users know traders, manufacturers, and products, so as to be a center and channel for OTOP trading and distribution.

Domestic business model uses e-Information to solve problems. It is a news resource for buyers and sellers. e-Replenishment lets sellers know how many

products in their stocks, if they always update their product lists. e-Purchasing uses HTML standard for receiving and sending information which is suitable and very popular, so that the users do not have to study more in order to use the function. Moreover, e-Purchasing in domestic business model is easier to use than in export business model. e-Consolidation and Distribution has the greatest problem, because assembling to purchase product is difficult which is similar to export business model. However, if buyers and sellers form a group and help each other, this IT Function would reduce transportation expense and find a channel for transportation. E-Producer, e-Product and Webboard should be created first, like in export business model, because they would let users know traders, manufacturers, and products, so as to be a center and channel for OTOP trading and distribution. In addition, buyers and sellers wished these IT Functions to be created first.

Local business model uses e-Information, e-Consolidation and Distribution, and Webboard to solve problems. In this business model, IT Functions and Architecture are the easiest to be developed. However, they have very little potential, because manufacturers usually find materials from resources which are not close to them. Moreover, they have little power of selling and production, so that OTOPDC in this business model should be created last.

After OTOPDC had been designed, it was taken to the host for evaluation. As a result, the host was very pleased with OTOPDC, especially domestic and local business models, because it is a technology that the host is good at, and the host has hardware and software knowledge, and personnel. Therefore, they can invest, take care, and develop OTOPDC. However, in order to use OTOPDC perfectly, it needs full cooperation from everyone. It needs information, knowledge, and budget support from Ministry of Commerce, Department of Foreign Trade, Department of Export Promotion, the Revenue Department, and Department of Internal Trade. Transportation companies and Thailand Post are the ones who transport products and materials as buyers and sellers want. These agencies also give information of transportation. Ministry of Information and Communication Technology is the one who take care and control the system, and buyers and sellers is the host who controls, verifies, and uses OTOPDC as shown in figure 7.1

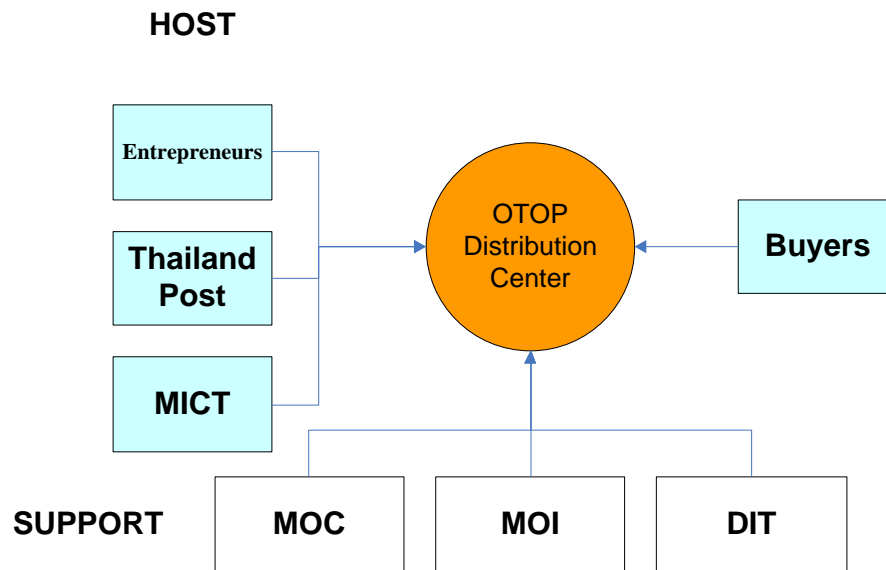


Figure 7.1 Hosts and supporters in OTOPDC.

7.2 Recommendations for future study

- 1) Design a function that shows products and manufacturer names equally that no one gets advantage or disadvantage.
- 2) OTOPDC can be applied with other products by studying business process technology and selecting scope of data which is suitable for the business.
- 3) It needs government and private agencies to design and develop system, so that these agencies would join to share information and know what they have to do.
- 4) E-business transaction needs experts to design and maintain, because it is very important.
- 5) After OTOPDC was developed for real usage, it needs to prevent troublemakers to distort the truth and post rude words.
- 6) It needs a modern and safety security system to protect information in OTOPDC all the time.

REFERENCES

1. Anna Nagurney: Supply Chain Network Economics: Dynamics of Prices, Flows, and Profits, Edward Elgar Publishing, 2006.
2. Alden Jay. A Trainer's Guide to Web-Based Instruction, ASTK, 1998.
3. Oliver R.K, Webber M.D. Supply-chain management: logistics catches up with strategy, 1992: 63-75.
4. Bureau of Logistics Department of Primary Industries and Mines, Ministry of Industry, 2008: 5
5. Thailand Post Co., Ltd. OTOP Express Catalog, 2005. Available from: <http://www.thailandpost.com/oldthailandpost/otop.asp> (Accessed 2008 February 4)
6. Post Service Thailand Post Co., Ltd. 2008.
7. Thailand Post Co., Ltd. Interested News & Event, 2005. Available from: http://www.thailandpost.com/news_main.asp?cid=1709 (Accessed 2008 February 17)
8. Hossein Bidgoli. Electronic Commerce. 2004.
9. Hugo Haas., Allen Brown. Web Services Glossary. Available from: <http://www.w3.org/TR/ws-gloss> (Accessed 2008 February 25).
10. Bergeron., Franois., Louis Raymond. The advantages of electronic data interchange. 1992.
11. Microsoft Corporation. RosettaNet and CIDX Messaging. Available from: <http://www.microsoft.com/technet/prodtechnol/biztalk/2006/library/rosettanet> (Accessed 2008 March 15).
12. Berthold Daum., Udo Merten. System Architecture with XML, 2003: 441-458.
13. Claudia-Melania Chituc., Cesar Toscano., Americo Azevedo. Independent and industry-specific initiatives: The case of the footwear industry, 2008: 741-757.

14. World Wide Web Consortium. Extensible Markup Language (XML). Available from: <http://www.w3.org/XML> (Accessed 2008 March 10).
15. Felix T.S.Chan., Niraj Kumar. Effective allocation of customers to distribution centres: A multiple ant colony optimization, 2009: 1-12.
16. Jing Wang., Yeong-Tae. Architectures Supporting RosettaNet, 2006.
17. Juha-Miikka Nurmilaakso. EDI, XML and e-business frameworks: A survey, 2006.
18. Somjit Artin. connectivity standard in supply chain and logistics management case study motorcycle's spare parts industry, 2008.
19. Walailak Atthirawong., Duangpun Singkarin et.al.. Development of logistic and supply chain for OTOP products, 2008
20. Jame A. O'Brien., George M. Software. Enterprise Information Systems book Thirteenth Edition
21. Panagiotis Katsaros. A road map to electronic payment transaction guarantees and a Colored Petri Net model checking approach. Information and Software Technology 51, 2009: 235–257.

APPENDICES

APPENDIX A

EVALUATION FACTORS TEST

The results from OTOP Distribution Center Factors for export business model.

Rating scale: 5 = Very good, 4 = Good, 3 = Fair, 2 = Poor, 1 = Very poor

Evaluation factors	Rating
	OTOP Distribution Center
Scalability – Can it handle the business processing demands of a wide range of end users, transactions and other information business processing requirements?	3
Flexibility – Can it handle your business process easily, without major modification?	3
Security – Dose it provide control procedures for errors, malfunction and improper use?	3
Quality – Is it attractive, suitable website, or does it have many errors in its program code?	4
Hardware – Does existing hardware have the features required to best use this software?	2
Maintenance – Will new features and bug fixed be easily implemented by our own software developers?	2
Training – Is the necessary training of personnel provided? What are its quality and cost?	2
Overall Rating	19
Average score	2.71

APPENDIX B

EVALUATION FACTORS TEST

The results from OTOP Distribution Center Factors for domestic business model.

Rating scale: 5 = Very good, 4 = Good, 3 = Fair, 2 = Poor, 1 = Very poor

Evaluation factors	Rating
	OTOP Distribution Center
Scalability – Can it handle the business processing demands of a wide range of end users, transactions and other information business processing requirements?	3
Flexibility – Can it handle your business process easily, without major modification?	3
Security – Dose it provide control procedures for errors, malfunction and improper use?	3
Quality – Is it attractive, suitable website, or does it have many errors in its program code?	3
Hardware – Does existing hardware have the features required to best use this software?	3
Maintenance – Will new features and bug fixed be easily implemented by our own software developers?	3
Training – Is the necessary training of personnel provided? What are its quality and cost?	3
Overall Rating	21
Average score	3

APPENDIX C

EVALUATION FACTORS TEST

The results from OTOP Distribution Center Factors for district business model.

Rating scale: 5 = Very good, 4 = Good, 3 = Fair, 2 = Poor, 1 = Very poor

Evaluation factors	Rating
	OTOP Distribution Center
Scalability – Can it handle the business processing demands of a wide range of end users, transactions and other information business processing requirements?	3
Flexibility – Can it handle your business process easily, without major modification?	3
Security – Dose it provide control procedures for errors, malfunction and improper use?	3
Quality – Is it attractive, suitable website, or does it have many errors in its program code?	3
Hardware – Does existing hardware have the features required to best use this software?	3
Maintenance – Will new features and bug fixed be easily implemented by our own software developers?	3
Training – Is the necessary training of personnel provided? What are its quality and cost?	3
Overall Rating	21
Average score	3

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