

## Implementation of Information Technology and Traceability for Rice Supply Chain

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### Abstract

Nowadays, information technology plays an important role in enhancing the efficiency and advantages in the commercial business. This study brings back information and retrieval systems. To make it easier for entrepreneurs (farmers) to reach consumers. Through ecommerce with the development of a website for farmers and consumers to share. Consumers will be able to check the return of goods. To ensure the purchase. And farmers use the information obtained from the order to develop and improve the quality of products. To increase the value of logistics and supply chain. Creating a data network for entrepreneurs (farmers) in Chiang Mai, Chiang Rai and Lampang participated in the study. And from tracking sales statistics and user surveys. After 3 months, the value of rice can be increased by 25 percent and the sales by 20 percent. The system also provides useful information to operators. To be able to develop and adapt to the changing market in the future.

Keywords: Information Technology, Rice, Supply Chain

### บทคัดย่อ

ปัจจุบันเทคโนโลยีสารสนเทศมีบทบาทสำคัญในการช่วยเพิ่มประสิทธิภาพและสร้างข้อได้เปรียบธุรกิจเชิงพาณิชย์ การศึกษานี้จึงนำระบบสารสนเทศและระบบสืบย้อนกลับมาใช้ เพื่อให้ผู้ประกอบการ (เกษตรกร) สามารถเข้าถึงผู้บริโภคได้ง่ายขึ้นผ่านอีคอมเมิร์ซด้วยการพัฒนาเว็บไซต์ที่ให้เกษตรกรและผู้บริโภคมีการใช้งานร่วมกันผู้บริโภคจะสามารถตรวจสอบข้อมูลย้อนกลับของสินค้าได้ เพื่อสร้างความมั่นใจในการเลือกซื้อสินค้า และเกษตรกรนำข้อมูลที่ได้จากการสั่งซื้อสินค้ามาใช้ในการพัฒนาและปรับปรุงคุณภาพของสินค้า เพื่อเพิ่มมูลค่าทางโลจิสติกส์ และห่วงโซ่อุปทานก่อให้เกิดการสร้างเครือข่ายข้อมูลจากกลุ่มผู้ประกอบการ (เกษตรกร) ในจังหวัดเชียงใหม่ เชียงรายและลำปางที่เข้าร่วมในการศึกษา และจากการศึกษา ติดตามข้อมูล สถิติการขายและการสำรวจผู้ใช้งาน หลังจากผ่านไป 3 เดือน สามารถเพิ่มมูลค่าของข้าวได้ 25 เปอร์เซ็นต์ และยอดขายเพิ่มขึ้น 20 เปอร์เซ็นต์ อีกทั้งระบบยังให้ข้อมูลที่เป็นประโยชน์กับผู้ประกอบการ เพื่อให้สามารถพัฒนาและปรับตัวกับการเปลี่ยนแปลงของตลาดในอนาคตได้

คำหลัก: เทคโนโลยีสารสนเทศ, ข้าว, ห่วงโซ่อุปทาน

### Introduction

Thailand is one of the leading countries in rice production and rice exportation. Thailand's

yearly income from rice exports is more than 154 billion baht [1]. In 2015, there were about 65 million Rai (1 Rai = 1,600 square) of rice farmland in

Thailand. On average, each Rai of farmland produced 532 kilograms of rice recently, the domestic and international market of rice has changed. In the local market, rice production increased due to the increasing demand. Also, rice is a staple food for most Thai people.

Marketing direction and distribution channels are important in the rice market. Normally, there are few channels for selling rice to consumers in Thailand's domestic market, and rice supply chain upstream to downstream can be long, due to the number of intermediaries in between the farmers, millers, and customers. The middlemen operations increase the price of rice. Most Thai farmers have low income and need financial assistance from the government. The current process requires several intermediaries to collect and transport rice, leaving farmers with little profit and information to plan for appropriate rice production volume. Moreover, the middlemen influence the price and domestic market direction and distribution channels. The power of market manipulation allows them to reap the largest proportion of the profits. The advancement of information and communications technology affects Thai's rice market structure. The advent of Web 2.0 and social media has created new ways to communicate, collaborate and share contents [2]. Social media now represents a popular source of information. It has changed the tools and strategies that companies used to communicate. The fact that control over information now lies with the customers should be highlighted [3]. The rice market structure in Thailand, however, seems to be outdated, uninteresting, and flawed.

The Internet plays an important role by providing convenience and fast means to communicate. Internet commerce brings new technology and new capabilities to business by sharing business information, maintaining

business relationships, and conducting business transactions. So, the farmer can use this the way of communicating to make advantages for their market.

## 2. Supply Chain Management

There are many definitions of supply chain management, such as a SCM, which requires traditionally separate materials functions to report to an executive responsible for coordinating the entire materials process and requires joint relationships with suppliers across multiple tiers [4]. Some of people defined SCM as: "The systematic effort to provide integrated management to the Supply Value Chain to meet customer needs and expectations, from suppliers of raw materials through manufacturing and on to end-customers." [5] In 1994, the International Center for Competitive Excellence had developed the definitions, later used "Supply chain management is the integration of business processes from end user through original suppliers that provides products, services and information that add value for customers." [6] The differentiated between the "demand chain," which creates demand, and the "supply chain," which fulfills it. He defined SCM as a "dynamic process of managing the flow of material and information across distributed business processes for profitably responding to and satisfying market demand." [7] The important of the supply chain is that the organization has management capabilities, business growth and business sustainability.

### 2.1 Rice supply chain in Thailand then and now.

Nowadays, glutinous rice (Short and fat shape) is grown mainly in the northern and the northeastern parts of Thailand; long grain rice is grown in the central and southern parts. The northeast part has 45% of all the country's rice

growing area, followed by the central and northern regions which have approximately 25% of the country's rice growing area. Mostly grown rice is jasmine rice 105. The rice grown in these areas is often planted for sale. [8] Fig 1 illustrates the long process of the rice supply chain in Thailand. The quality of products delivered to consumers is often reduced. Although Thailand is a major exporter, farmer cannot set the price of rice by themselves. Rice millers and traders are the key players in the midstream activities at the paddy processing level of the rice industry. Prices change according to the market mechanisms. Example the paddy rice process from upstream to downstream First farmers grow paddy and bringing the paddy to the mill or the middleman come to collect the paddy from the farmers by force the price down. Then the mill milled the paddy to white rice. After that, rice was sent to major and minor traders and was shipped to the consumer.

Rice is a major economic crop of Thailand; exporting rice worth about 156 million baht annually (Agricultural Research Development (Public Organization)). This is illustrated in Fig 2 (Information and Communication Technology Center Office of the Permanent Secretary for Commerce By the cooperation of the Customs Department). Thailand is also the center of rice research. Rice is the main food of Thais; Thais consume 6.9 million tons of rice annually. The consumption of rice in the household is on average 101 kg per person per year. For urban households, the average consumption of rice is 21 kg less than that of rural households [9].

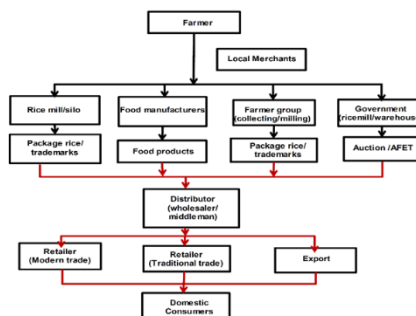


Fig 1 Components of the rice supply chain of the flow of rice in each section

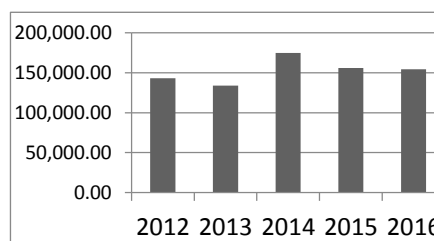


Fig 2 Export value of rice during 2012-2016 in Thailand

Population growth affects the growth of rice consumption. Rice growers suffer from lower rice prices, while the cost of production is likely to rise because chemical fertilizers, agricultural machinery equipment, fuel, etc. making the net income of the farmers inadequate for their livelihood, and lead to relocation of part of the workforce into cities after harvests. Social problems follow.

As population grows, demand for rice increases. Past volume of rice production becomes insufficient for domestic consumption and exports.

Thailand's rice process must go through many steps before it reaches consumers. The distribution process of rice is divided into four phases, with the first three being about 30 percent each and the final one being 10 percent if the rice is having proper of humidity, it will be sold, but if not, it will be stored in the. Rice traders or agents will buy rice and deliver them to the mills. When

the mills convert paddy rice to white rice, one part of the rice will be sold to local consumers. The mills play a role in pricing the paddy. Yong (middlemen in the supply of rice from the rice mills overseas) plays a role in pricing rice, because it sets the wholesale price of rice wholesale and export. Yong handles approximately 66% of the total rice trades, including those sold domestically and those exported.

Habits of consumers have changed in the age of globalization. By purchasing 50 to 100 kg sacks of rice, the present consumptions of rice bags containing between 0.5- 20 kg which is popular for consumers in household. Since the way of life has changed: Small families have become big families, some having 2-3 households living together. Patterns of traditional retailing at general store sales are also changing: At present, there is a continuous expansion of large department stores, convenience stores and integration between information technology and business [10].

## **2.2 Information Technology the new ways of communication**

“Information is power” is what we often hear from various media especially in the third wave or the Information Technology era and communication (Information and Communication Technology: ICT). ICT play a role in driving social development and economic globalization [ 11] . defined IT as “ any form of computer- based information system, including mainframe as well as microcomputer applications. ” In business applications, the range and strategic impacts of such systems are vast.

The Internet has become a mass media vehicle for consumer- sponsored communications. It now represents the number one choice of media at work and the number two choice of media at home. Several companies are already using social

networking sites to support the creation of brand communities [12] or for marketing research in the context of ethnography [13] Thais use mobile phones to access the internet, on average, for 5.7 hours per day. And most popular activities on the Internet, accessed through mobile devices, are social network, followed by searching for specific information and electronic book reading, respectively [14].

There is an upward trend in search activities. According to a survey conducted, 64.9% of Thais who have purchased. The buyers read product reviews on the Internet. The Social media is a popular marketing tool for Internet users around the world easily.

### 2.3 Traceability System in food industry

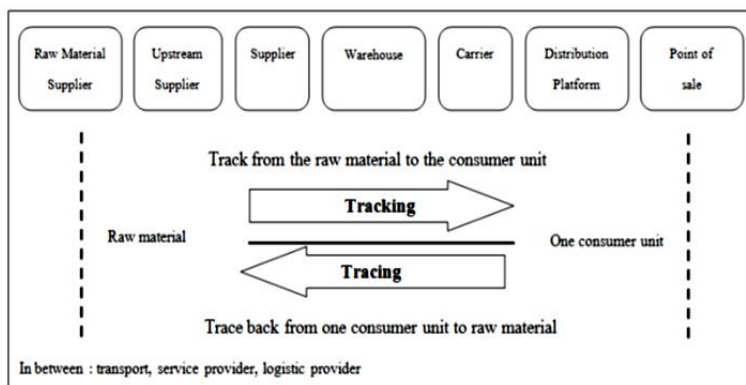


Fig 3 Process of traceability system

It is system to track the origin of goods throughout the supply chain. From production process to consumer which each step has detail in the production process to track the return correctly. The process is to find the source of the product for use as a destination for the product. Also the system designed for consumers more confidence in the purchase to consume that purchased product is not contaminated and safe. It can check the route of the food and reduce the loss of recall of the manufacturer to restore it properly, quick and accurate as shown in fig 3. [15] Through the deployment of a traceability applications by apply QR Code technology on mobile phones as shown in fig 4. To optimize the supply chain management. It also adds traceability capabilities and track distribution of products. The size can be taken to put in the of rice package by applying information technology data transfer through electronic system will be a great benefit to the mass consumers and benefit with farmers in value added [16].



Fig 4 the process of QR Code

### 3. Implementation of IT

In this project using the web platform of PHP to make the website because the process of platform is fast and easy support this platform is more popular. A case study that shows the implementation of information technology. It presented the Rice Innovation Roadmap, which could drastically change the facts of rice farming and consumption in Thailand. These are termed "e-commerce." E-Commerce is the trading of goods and services using electronic media and channels. System implementation generally benefits from high levels of user involvement and management support. User participation in the design and operation of information systems has several positive results. First, if users are heavily involved in systems design, they move opportunities to mold the system according to their priorities and business requirements, and more opportunities to control the outcome. Second, they are more likely to react positively to the change process. Incorporating user knowledge and expertise leads to better solutions.

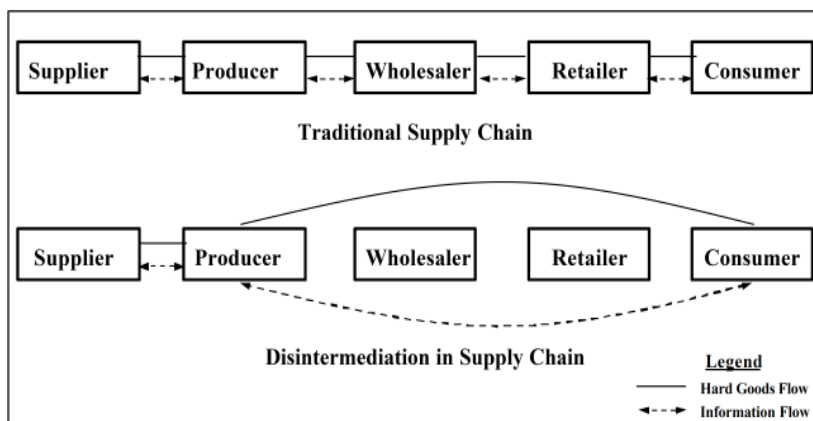


Fig 5 Disintermediation in the B2C Supply Chain

As shown in Fig 5, the web or social media can serve as a disintermediator by replacing the intermediary links in the traditional supply chain with a direct channel between producers and consumers [17]. If done correctly, this can lead to lower costs for the consumers, and improved service quality.

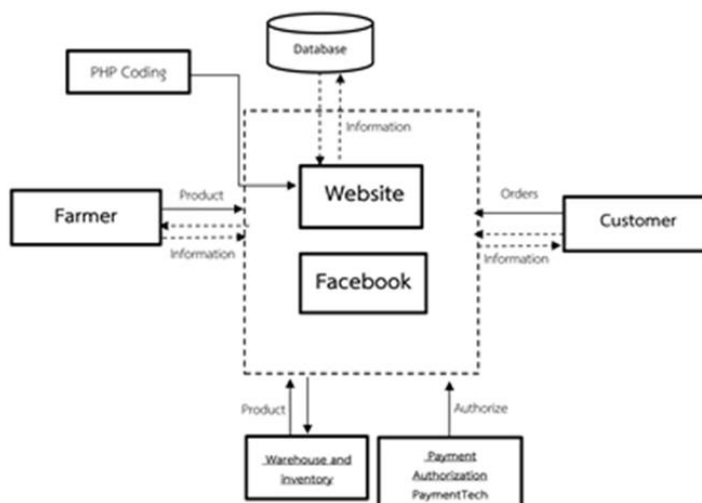


Fig 6 E-commerce systems

As fig 6 its shows the E- commerce system it can be used as a guide to buy - sell rice and to encourage farmers to distribute their produces. But it's not popular for Thai people. From the past to present the way of farmers can buy - sell rice directly to consumers by themselves. It will reduce the cost of products in the direct delivery channel. Direct delivery by online sales and Ship directly to retailers or retail such as

department stores or local stores. This creates a good relationship between manufacturers and consumers, build consumer confidence in the product, and help farmers know the needs of consumers. Reducing the supply chain by farmers to be able to get a better control over the prices of sales themselves and allowed consumers to have access to fresh and clean products.

The project used a Domain name

<http://www.Mostdirectrice.com> for promoting and as a channel to connect to the entrepreneurs that participated in the Rice Delivery Program to online stores of participating operators directly the home page of the site is illustrated in Fig 6. The cost of building the website was relatively low for the level of accessibility and user friendliness if offered. The web site also provided a variety of information, enhanced the ease of communication, and reduced time and travel costs, time to find information or make purchases.



Fig 7 Home page of the website used by the project.

Url : <http://www.mostdirectrice.com>.

Web design could be more attractive than offline stores, and online media also had the advantage of technology and features. However online businesses have different advantages and disadvantages, the advantages of a business outweighed the disadvantages.

The project also added QR Code label on Rice package, by using the freeware QR Code generator as shown in Fig 8. The information is depending on the farmer as shown in Fig 9 to add. The project used URL sales channels through social media in QR Code on the package. So, the consumer can trace back the product between farmer and consumer.

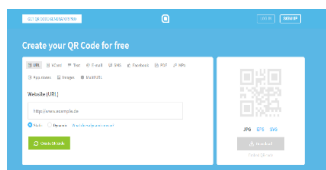


Fig 8 QR Code generator



Fig 9 The example of information form QR code label on rice package

The project also provided other sales channel through social media, Facebook as shown in Fig 10. It provided a shop for the products of the project under the project branded rice and other participating branded products. The purpose was to have another channel to distribute to participating rice products, so customers could connect to the online media of participating farmer groups and shop. This increased the sales of farmer groups, reduced the required processes, resulting in a more convenient ordering procedure for customers and delivered through the logistics provider are acceptable price. Convenient for customers. The product delivered to your home and are not damaged by shipping.



Fig 10 Example of other sales channels through social media

#### 4. Conclusion

The importance of IT to the world economy is self-evident. Few of the structural changes in our economy would have come about without advances in IT. But not all the business can be implement the IT. From the data collected over the period of 3 months and analysis of consumers' habits, the project found that online trading trend is likely to increase by the total of the users are 346 users in the 3 months of implemented. First month sales were slow, but the

sales volume grew during the third month, possibly because consumers have increased awareness.

The project has new development idea in packaging can be more paperless and easy to transport but less damage to the package that will affect to the cost and profit to the farmer. The project suggestions the sustainability for the farmer by be improved in the following areas: updating movement, effective online storefront management, service responsiveness, packaging, products quality and continuous advertising. These are likely to stimulate sales and maintain the highest customer base. The implementation of information added value to rice product in supply chain by approximately 50 percent from 15 baht to 39 bath and increased sales by approximately 20 percent about 3,500 kg.

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