VALUE ADDED OF AGRICULTURAL PRODUCTS BY INFORMATION TECHNOLOGY THROUGH ELECTRONIC MARKETING

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ABSTRACT

Agriculture is the primary sector that generates major income for Thailand every year. Many agricultural products are popular with both domestic and foreign consumers in the form of raw and processed products. However, Thai farmers often suffer from low agricultural product prices and can't sell their products despite the fact that demand of these products in the consumer market have still remained. One of the main reasons is, most Thai farmers are lack of knowledge and information for planning to produce and develop their products that meet the needs of customers. In addition, they don't know who are their target customers and how to promote their products effectively. This research aims to develop information systems that can analyze target customers, the characteristics and quality of the goods which match to the customer demands. This information will be used for the planning of production, product development, and e-marketing to provide distribution channels which can be promoted to the relevant target consumers effectively. The research process is divided into 4 steps: 1) The survey and collection of information related to the production and trade of agricultural products from all related stakeholder groups, including government organizations, farmers, entrepreneurs, and consumers. 2) The creation and development of the database and information system. 3) The training to educate farmers and entrepreneurs. 4) The experiment and evaluation of information usage. The results showed that the farmers and entrepreneurs who participate in this research have a good level of knowledge and skill in the application of information for production planning and development to meet the customers' demands as well as using of electronics marketing to promote their products, which can increase the value of each product between 25-350%.

Keywords: Agriculture, Electronic marketing, Information technology, Value added.

INTRODUCTION

Thailand is an agricultural country. Most of the population accounted for 30.69 percent of the total worker population, are farmers [1]. Agricultural products are the major products that drive the main income for Thailand every year. In 2017, the Office of Agricultural Economics, Ministry of Agriculture and Cooperatives has reported that Thailand exports agricultural products worth 1,355,501 million baht, accounting for 18.58 percent of all export products [2]. There are many agricultural products that generate income for Thailand, such as rice, vegetables, fruits, etc. Despite having plenty of products and high demand, but often found that each year the farmers still suffer from the problem of falling agricultural prices due to 2 important reasons: 1) The products that are produced do not meet the needs of the consumers and 2) Lacking of the effective marketing management that cause the farmers unable to offer their products to the target consumers. As a result, though the products even have good quality because the distribution channels are not suitable enough, the consumer has no information and cannot access those products despite the high demand. For many years, although the government has many projects related to agricultural product development and encourages farmers to develop their products in various areas of the country, such as the OTOP (One Tambon One Product) project [3], the project for development of agricultural product quality to the standard [4], etc. However, these projects tend to focus on only productivity and quality of the products while overlooking the management of effective marketing that using systematic analysis of essential data, such as the demand, supply and the needs of the consumers for the planning of product quality development that is consistent with the needs of the consumers as well as the electronic marketing which is very effective in modern trading.

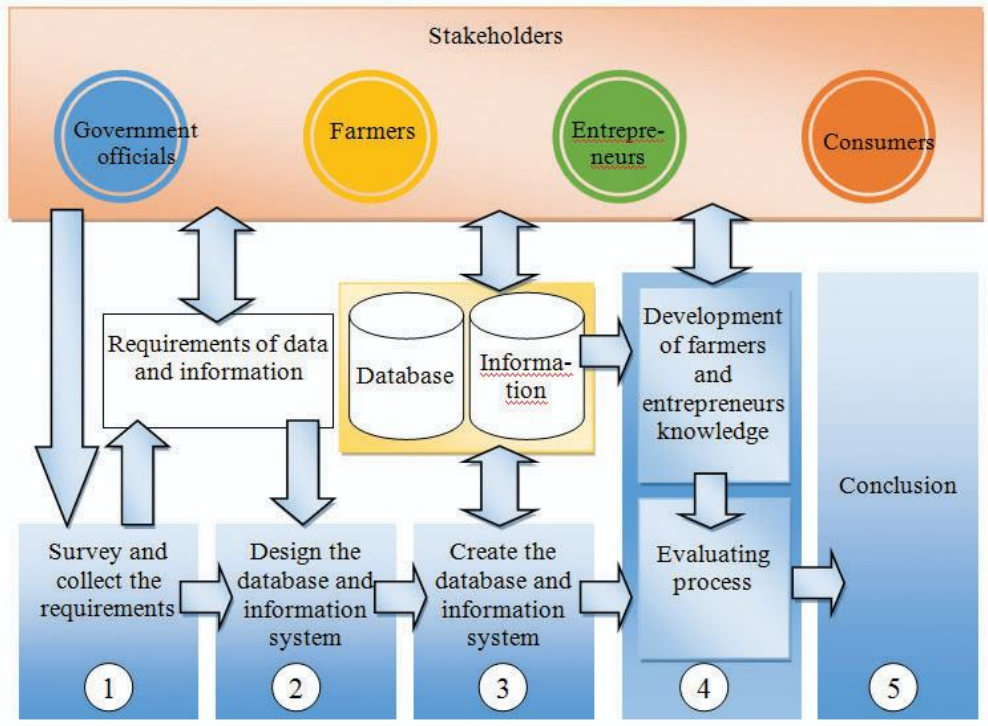
The aim of this research is to develop a database and information system that consistent to the requirements

of all agricultural products' stakeholders, to help farmers and entrepreneurs to have accurate and up-to-date information for use in production planning, product development, and marketing management in order to increase trade value for agricultural products. The research area is Bang Nok Khwaek Sub-district, Bang Khonthi District, Samut Songkhram Province that is one of the most important agricultural areas near Bangkok. To achieve research objectives, we collected and integrated the requirements in data and information from all stakeholders who related to agricultural products. Then, we analyze these data and information in order to edit, improve and collect additional information to create the most complete and up-to-date database and information system. This database and information will be processed with various techniques to create the information that can be used in production planning, marketing management to making the solution to the point exactly and covering the actual needs of all stakeholders. It also reduces duplication of data storage and maintenance as well as increasing the standard of information and accuracy when this information was used by each stakeholder.

METHODOLOGY

The diagram shown in Figure 1 is the summarization of the conceptual framework of this research.

Figure 1
Conceptual framework of the research



As shown in Figure 1, the process of this research was divided into 5 steps, including

1. Survey and collect the requirements for data and information of the stakeholders.

In this step, we survey the requirements for data and information of the stakeholders which are divided into 4 groups, including 1) government officials, 2) farmers, 3) entrepreneurs and 4)consumers. For the first 3 groups, 32 voluntary participants consisting of 5 government officials, 22 farmers, and 5 entrepreneurs were invited for meeting to clarify the research's objectives and the research processes, as well as collecting the requirements of each stakeholder. Then, all data and information was analyzed in order to make corrections, improve and collect additional data to get the most complete and up-to-date data.

For the fourth group, the consumers. We collected various data such as age, gender, characteristics and quality of the desired product, etc., by using a questionnaire. The details of the data collection for this research were divided into 4 categories as follows:

1.1 Agricultural product data (both fresh products and processed products), such as product characteristics, production sources, quality, quantity, production season, etc., were collected from the original database of the agricultural district. Additional data are collected using the survey's form of agricultural products.

1.2. Data of farmers, such as product type, characteristics, and quality of products, the amount of products, etc., were collected from the original database of the agricultural district. Additional data are collected by using the survey's form of farmers.

1.3. Data of entrepreneurs, such as the name of the product sold, type of product, characteristics, and quality of products, distribution channels, etc., are collected from the original database of the agricultural district. Additional data are collected using the survey's form of agricultural entrepreneurs.

1.4. Consumer's data, such as age, gender, desired products, characteristics and quality of the desired product, etc., are collected from the original database of the agricultural district. Additional data are collected by using questionnaires.

2. Design the database and information system.

In this step, the data collected from the first step was analyzed to design the database and information system by synchronizing all data, defines the information that each group is involved, and establishing reliable data security. Then processed the data to create information that meets the needs of each stakeholder, including

- Summarizing data on the production of agricultural products, classified by various variables such as types, characteristics, quality and seasons.
- Summarizing data on quantity and value of agricultural product sales, classified by type and characteristics of products, cover both fresh products and processed products.
- Characteristics analysis for the form and quantity of each product that meets to the consumer needs.

This information can be used in planning for products' development to meet the quantity and quality that is consistent and sufficient for the needs of the consumers.

3. Create the database and information system.

In this step, the database system will be created and processed to create the information as designed in step 2 using various techniques and methods such as data mining and data warehousing. And then test the operation of the system to find errors and make corrections before continuing to use.

4. Development of farmers and entrepreneurs knowledge.

In this step, the farmers and entrepreneurs will be trained for knowledge and understanding in the use of database and information systems for production planning, quality development and electronic marketing that will help increase distribution channels to promote sales and communicate to target consumers more efficiently. To evaluate the training process, we test the participants by 50 questions about knowledge and understanding in the use of database and information systems both before and after the training, then compared the scores and analyze the results by paired sample t-test [5].

5 Evaluating process

In order to evaluate the research result, 18 products from 15 farmers and entrepreneurs were voluntarily joined as the research's products in this step. The quantity and sales of the research's products were collected both before and after using the database and information systems, and electronic marketing management. These data were analyzed and compared for evaluation.

RESULTS

Comparing knowledge and understanding about the use of database and information systems of the participants

The scores of testing for knowledge and understanding of the participants in using of database and information systems for production planning, quality development, and electronic marketing both before and after the training are shown in Table 1

Table 1
The score of knowledge and understanding of the participants before and after the training

Participant#	Pretest-Score	Posttest-Score
1	5	45
2	2	48
3	7	39
4	4	42
5	3	40
6	5	42
7	11	50
8	8	48
9	10	47
10	4	45
11	5	39
12	8	45
13	10	47
14	9	42
15	15	49
16	12	41
17	10	46
18	9	42
19	7	45
20	6	44
21	5	47
22	9	42
23	7	39
24	5	40
25	8	45
26	3	44
27	13	50
28	7	42
29	5	44
30	3	47
31	12	45
32	6	43
Average	**7.28**	**44.19**

The result of Paired sample T-test are shown as in the Table 2

Table 2
The result of Paired Sample T-test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Posttest-Score - Pretest-Score	36.90625	3.68396	.65124	35.57804	38.23446	56.671	31	.000

Comparison of product sales before and after using the database and information systems and electronic marketing management

The results are shown as Table 3.

Table 3
Average Sales of products before and after joining the research

Product #	Average Sales per day		
	before joining the research	after joining the research	%increase
1	374.50	654.25	74.70
2	600.00	751.20	25.20
3	380.00	1,711.52	350.40
4	707.00	1,574.77	122.74
5	718.50	1,705.00	137.30
6	446.60	641.94	43.74
7	458.50	894.53	95.10
8	732.50	1,811.11	147.25
9	532.00	1,342.77	152.40
10	468.40	1,032.26	120.38
11	435.40	779.02	78.92
12	930.00	1,414.53	52.10
13	640.50	1,628.92	154.32
14	611.80	1,985.29	224.50
15	448.50	1,256.83	180.23
16	300.00	788.40	162.80
17	656.25	1,145.16	74.50
18	792.05	1,308.70	65.23

CONCLUSION AND DISCUSSION

As the results shown in the former section. It can be seen that the knowledge and understanding in using of database and information systems for use in production planning, quality development and electronic marketing of the participants in the research has increased significantly after receiving training. With an average score increasing from being. In addition, the sales of each research's product is increase between 25.20-350.40%, after using the database and information systems for production planning, quality development and electronic marketing. However, this research was hold in the small research area with a limitation on 2 years historical data. Therefore, some effective information, such as forecasting on the demand and supply of each products, cannot be provided according to lacking of sufficient historical data. In this case, the Ministry of Agriculture and

Cooperatives is currently in the process of developing the Thai Agricultural Big Data by linking data with various agencies' systems together [6]. Moreover, There should be periodically training the farmers and entrepreneurs for new techniques, knowledge, and develop their skills in managing electronic marketing which will helps them to create additional value for their products more effectively.

ACKNOWLEDGEMENTS

The author would like to thank the Research and Development Institute, Suan Sunandha Rajabhat University, Bangkok, Thailand for financial support.

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