

Exploration of Readiness of Smart Farmers in Bangkok and Suburban

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Abstract— The research study is to survey the use of smartphone applications of farmer in order to readiness with the objective of this research is to study the role of the Internet of Things for farmers in order to use the research results obtained as data for formulating strategies, Policy of the organization or related departments and guideline for the development of Internet of Things for crop growers both in Bangkok and suburban various areas. There are 400 farmers. That are right in the research namely farmers in Bangkok and suburban. Use in-depth interviews with 10 farmers and 400 questionnaires to collect data. Then analyze the data by statistical values basic including percentage, average, standard deviation, Independent t-test, One-Way Anova, Least Significant Difference including. Analysis of problems arising from operations and system requirements for design and develop internet technology in everything for farming.

Keywords- *Exploration of Readiness; Readiness of Smart Farmers; Smart Farmers; Farmers in Bangkok; IoT;*

I. INTRODUCTION

Currently, Thailand has an increasing rate of internet access. In addition, the telecommunication network has been continuously expanded and available in a variety of ways. As a result, the lifestyle of today's population has to rely on and rely on more communication via the internet. Then, starting with the adoption of the agricultural sector to increase its role in sustainable development. According to the government policy of Thailand 4.0, which focuses on economy driven by innovation, Value-Based Economy, with the view that the importance of new innovations to help drive the economy in Thailand 4.0, focusing on food. Agriculture and Biotechnology [1]. The technology increasingly available and technically different to the agricultural sector needs to improve productivity to reduce the cost to acquire a working smart towards smart farmers [2][3]. Thai farmers in the past were reputed to be farmers who worked tirelessly [4] but now Thai farmers in Thailand 4.0. Which is the starting point of Smart Farmer is not harming nature, using resources as needed, then

making it more comfortable, not the more tired such as having a small area but can be designed to be planted in combination and supportive. The farmers must be able to use technology because Smart Farmer people have to connect the world by themselves Also have to understand since the production process, management, understand nature and understand technology [5].

According to the national strategy, the policy for agriculture is to improve the quality of life of low-income farmers by increasing their revenue, creating sustainable farming and co-friendly, adopting and exploiting technologies and innovation to produce agricultural products and transforming farmers' perspectives from simple individual occupation to agribusiness [6]. This is why the concept of the Internet of Things application to help manage the growing households in areas with limited benefit most by Smart Farmer. Referring to my previous argument the farmers must be knowledgeable persons in agriculture and technology, able to be fully integrated, to solve problems, have ideas, know how to plan, and who know how to use technology to reduce problems in labor. Advancement in technology, combined with the development of smartphone devices and government policies that have an idea of the role of Internet of Things for Thai farmers. Therefore, it is the source of the needs survey before becoming a smart farmer in the future effectively. Starting with a survey of farmers in Bangkok and suburban. The technology took part in the occupation, the rice may have an important role to help make rice more efficiently, reduce risk and achieve comfort and forecasting decisions. It also motivates the Thai agriculture to use more Internet of Things technology.

II. CONCEPTUAL FRAMEWORK

The research hypothesis stated as follows:

1. Different demographic factors affect different to use the internet of things.
2. Agriculture areas and the cost of rice cultivation are related to the use of Internet of Things.
3. The ability to use technology is related to the control of the Internet of Things.

The conceptual framework for the research is shown as the following:

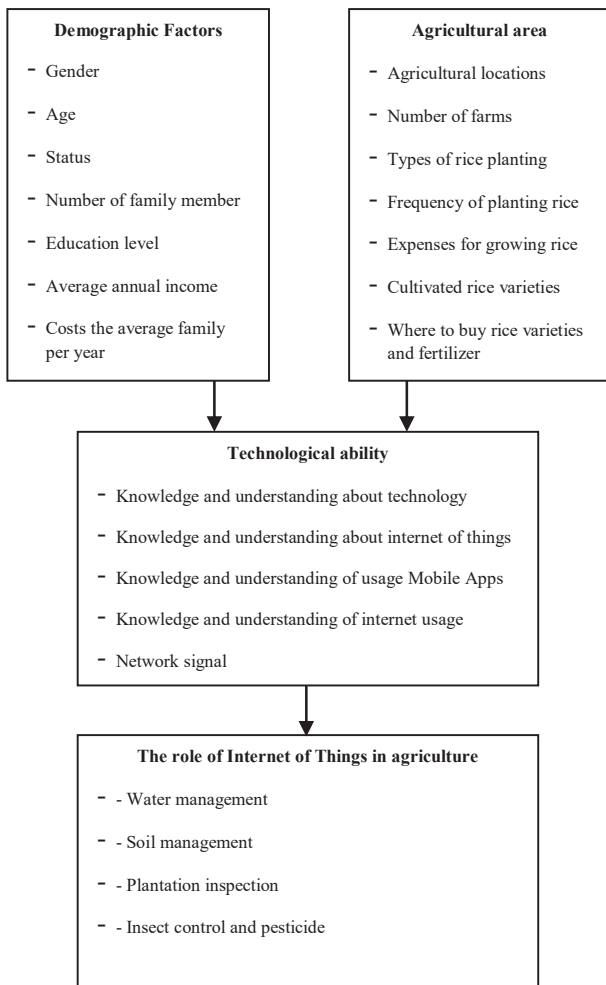


Figure 1. Conceptual Framework.

III. LITERATURE REVIEW AND RELATED STUDIES

The Internet of Things is that things are all linked to the Internet. Humans can have to used and control devices via the Internet. For example, Open-close order Electrical appliances, automobiles, mobile phones, communication tools, office supplies, agricultural tools, industrial machinery, houses, daily life appliances through the internet, etc. This technology will be both enormously beneficial and risky at the same time [7][8].

Elements of the Internet of Things consists of 3 main parts: [9]

1. Sensor & Activators are the parts of receiving data
2. Connectivity is the part of the connection to the network such as Wi-Fi, GPRS, 3G, etc.

3. People & Process is the part of users and the working process of the internet of outsourcing equipment.

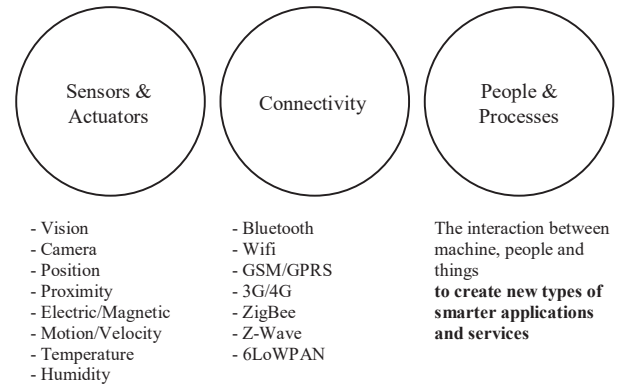


Figure 2. Elements of the Internet of Things (The Thailand Research Fund, 2015)

The main goal of the Internet of Things is to enable computers to sense information without the help of humans. Part of the Internet; The obvious evolution is the transition from the current network to the new network that connects different perceptions and responds to the appropriate model in the real world. Currently, the new internet system still uses the network standard in providing data transmission, data analysis, application, and communication. Obviously, if combined with the emergence of devices that can connect to the network wireless technology such as Bluetooth, Radio Frequency Identification (RFID) and WIFI to help in the work and process for fast and efficient. After that, the network will connect the Internet of People to communicate. Resulting in a smarter environment facilitates the use of human life.

The application of the Internet of Things in various forms has an important role in the daily lives of humans. Including conducting various activities, all relying on the Internet of Things with modern items or equipment The development of technological innovations has enabled the government, industry, to use the benefits of Internet of Things to develop organizations to adapt to new life, including Smart Farming. It is the application of the internet of agriculture for agriculture by using this technology to control the quality and increase the productivity of farmers. The agricultural sector in the world is divided into 2 types [10] as follows.

1. The change from agricultural chemical dependence on synthetic biology to agriculture. (Bio-agriculture or Synthetic Biology)
2. Changing from outdoor farming, which is a traditional agriculture that has to fight against climate to indoor farming that cultures and feeds animals in buildings with controlled environments.

Agriculture in Thailand having many problems. Especially in terms of production that is still not high and

the average farmer's income is low because farmers do not have enough knowledge Lacking marketing insights for production planning Including knowledge in the production of high-quality agricultural products are safe for consumers and environmentally friendly. The concept of Smart Farm is therefore an important mechanism to increase product standards. By focusing on agricultural development in four areas: 1) cost, 2) increase the production quality and product standards, 3) reduce the risk of pests and natural disasters 4) management and transfer of knowledge.

In addition, research has conducted studies on technology adoption, saying that the influence of technology use patterns the Trust and Expectation of an Individual on Intention to use the Internet of Things there is still a small acceptance of usage at present [11]. Research on agricultural technological innovation system evaluation from research and utilization in sustainable community development found that: Factors that enable agricultural technology to be utilized for sustainable community development consist of 7 main factors, including research source identification, participation in innovation processes, plan clarity, technical readiness Of agricultural technology, economic readiness The benefits that the community expects, and the availability of technology transfer to recipients [12].

IV. ANALYSIS OF DATA

The finding revealed that majority of population were male, age over 50 years old, marital status, family members between 4-5 people, secondary education or lower, average income between 300,001-400,000 baht per year, annual family expenses in the amount of 200,001-300,000 baht per year. Data analysis by each category using descriptive statistics is shown in Table I-VII.

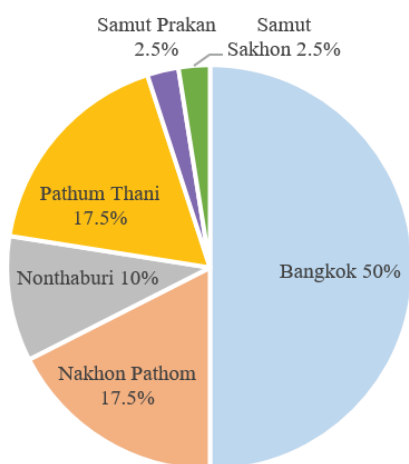


Figure 3. Showing the ratio of the amount of agricultural area and percentage.

For information on agricultural areas separated by issue, it is found that: Farmers have 10-15 rai of farmland, rice planting type most Transplanted rice field and Broadcast rice field, plant rice 3-4 times a year, investment money for planting 30,001-40,000 baht per time, most of them planted rice in Pathum Thani variety, rice purchasing source at Rice Seed Center (Department of Rice), and buying fertilizer at general agricultural stores.

TABLE I. DISPLAY MEAN AND S.D. FOR KNOWLEDGE, UNDERSTANDING, AND TECHNOLOGICAL ABILITY.

Ability	\bar{x}	S.D.	Meaning	Order
1. Use the internet everyday	3.09	0.87	Occasionally	3
2. Sharing information via social media (Facebook, LINE etc.)	3.05	0.88	Occasionally	4
3. Use smart phones to communicate mainly	3.55	0.51	Frequently	2
4. Good network signal and communicating effectively	4.25	0.64	Very frequently	1
5. Internet device control	2.62	0.68	Occasionally	5

The results of the survey concluded that good network signals make communication more efficient, resulting in increased use of mobile technology. This is the main factor that all the farmers turn to use mobile phones to communicate mainly.

TABLE II. DISPLAY MEAN AND S.D. FOR KNOWLEDGE HOW TO USE THE INTERNET OF THINGS OF FARMERS.

IOTof farmers	\bar{x}	S.D.	Meaning	Order
1. Rice production technology with wet and dry water management	3.05	0.80	Average	4
2. Postharvest Soil Management Technology	3.72	0.63	Good	1
3. Determine the proper date of harvest Technology	3.64	0.74	Good	2
4. Technology for using chemicals /biological substances for pesticides	3.21	0.67	Average	3

The farmers have knowledge of technology how to use to manage soil more than knowledge of harvesting. Chemical use and water management respectively.

Hypothesis 1: Different demographic factors affect different to use the internet of things.

TABLE III. DISPLAY T-TEST FOR CLASSIFIED BY DIFFERENT GENDERS AFFECT THE USE OF THE INTERNET OF THINGS DIFFERENT.

Used to Internet of Things	S.D.	t	Sig.
Knowledge, understanding about the Internet of Things	1.423	-3.764	0.001*
	1.197		

Comparative analysis of the gender of respondents affects the Internet of Things usage differently. It is found that in all areas, females are using the Internet of Things more than males.

TABLE IV. DISPLAY F-TEST FOR CLASSIFIED BY DIFFERENT AGES AFFECTING DIFFERENT TYPES OF INTERNET OF THINGS. AND AVERAGE REVENUE PER YEAR BY DIFFERENT IMPACT ON THE USE OF INTERNET OF THINGS DIFFERENT.

Used to Internet of Things	Factors	f	Sig.
Technology ability	age	8.588	0.000*
	annual income	56.300	0.000*
Knowledge and understanding of Internet	age	33.668	0.000*
	annual income	3.991	0.008*
Knowledge and understanding of Mobile application	age	4.207	0.016*
	annual income	4.544	0.004*
Knowledge and understanding about Internet of Things	age	43.789	0.000*
	annual income	23.743	0.000*
Network signal	age	17.367	0.000*
	annual income	17.367	0.000*

Note: *Significant at the statistical level of 0.05

Different ages affect the use of the Internet of Things in terms of technological capabilities, cognitive usage of the internet, cognitive usage of mobile applications, and knowledge and understanding of the Internet of Things.

Shows that the average annual income is different, affecting the use of the Internet of Things different.

Hypothesis 2: Agriculture areas and the cost of rice cultivation are related to the use of Internet of Things.

TABLE V. DISPLAY THE CORRELATION COEFFICIENT BETWEEN THE AMOUNT OF AGRICULTURAL AREA AND INTERNET OF THINGS USAGE.

Factor	Correlation values with Internet of Things	Significance level	Meaning
Number of agricultreal area	-0.184*	0.000	Poor

The analysis of the relationship between the amount of agricultural area and use of the Internet of Things has a significant level of 0.000, meaning that the amount of agricultural area has a relationship with the use of the Internet of Things.

TABLE VI. DISPLAY THE CORRELATION COEFFICIENT BETWEEN THE COST OF RICE CULTIVATION AND INTERNET OF THINGS USAGE.

Factor	Correlation values with Internet of Things	Significance level	Meaning
Agricultural expenses	-0.421*	0.000	Average

Note: *Statistically significant level 0.01

The correlation analysis results mean that the costs of rice planting are related to the Internet of Things.

Hypothesis 3: The ability to use technology is related to the control of the Internet of Things.

TABLE VII. DISPLAY THE RELATIONSHIP BETWEEN TECHNOLOGY USAGE AND DEVICE CONTROL THROUGH THE INTERNET OF THINGS.

Factor	X ²	Cramer's V	Sig.
often used computer or notebook.	13.470	0.130	0.009*
Using a smartphone fluently	3.556	0.094	0.169
Connect to the internet everyday	102.68	0.358	0.000*
Modern technology can be applied to agriculture effectively.	8.298	0.102	0.081

Note: *Significant at the statistical level of 0.05

Frequent use of computers or notebooks and daily use of the internet is associated with device control over the internet in all things.

Hypothesis testing can be summarized as follows:

Hypothesis 1: Different demographic factors affect different to use the internet of things. It appeared that the demographic factors of gender, age and income differences affect the internet of things.

Hypothesis 2: Agriculture areas and the cost of rice cultivation are related to the use of Internet of Things. It is not surprising that two factors affect the relationship of

the internet of things with statistical significance at the level of less than 0.01.

Hypothesis 3: The ability to use technology is related to the control of the Internet of Things. Found that the ability to use technology for Notebook is active as both an Internet connection frequently. Both of these factors affect the relationship with controlling the Internet of Things.

V. CONCLUSION

In the principles of the 20-year strategic plan of the country [13]. that has changed digital technology continuously and rapidly. It can be said that there is a constant disruption in this industry [6]. Research to explore the factors and basic knowledge on smart phones and the internet of Things technology. This shows the usage characteristics Knowledge and understanding of technology will help modernize agriculture in Thailand. Which needs to be developed and prepared to the point So that Thai farmers gradually adapt to the use of technology [14].

The result of the research shows that if farmers want to become smart farmers, the factors related to the preparation for the development of the Internet of Things technology begin with the fact that they use computers to connect to the internet as regular Will enable them to adapt to the technology for managing smart farmers very well.

VI. LIMITATION AND FURTHER STUDY

The next research should conduct a survey study for system developers to inspire and interest about software development by collecting data to create new technologies. This may be a training session for providing knowledge, directly conducting behavior studies with farmers. In order to use the information to plan for the development of applications to match the Thai context.

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